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THE OUTLOOK FOR TIMBER IN THE UNITED STATES

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FOREST SERVICE • U.S. DEPARTMENT OF AGRICULTURE

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FOREST RESOURCE REPORT NO. 20

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Foreword

This report on the Nation's timber supply and demand situation and outlook relates primarily to the 500 million acres of commercial timberland in the United States that are suitable for production of timber crops. Although limited primarily to timber, the report recognizes that these lands must also provide recreation, water, wildlife, and other similar products for the American people. Achieving a balance between rapidly rising demands for timber and these other goods and services is a challenge for American forestry that must be met.

The implications of comparisons of prospective timber supplies and demands presented in this report are clear—demands for lumber, plywood, woodpulp, and other products are increasing more rapidly than available timber supplies. This can only mean rising prices of timber and timber products.

Growing needs for raw materials for housing and other economic development in the United States might be met in part by greater use of substitutes for timber such as steel, aluminum, and plastics. But this alternative involves problems of high energy requirements, pollution impacts, balance of payments problems, and accelerated depletion of nonrenewable resources. Timber imports also might be expanded but this option is limited by rising demands for timber throughout the world.

The better alternative, in my view, is to improve the utilization of available timber supplies in the United States, and to increase timber growth and harvests in the longer run by accelerated tree planting, stand improvement, protection, and other forestry measures. This alternative will require substantial investments and balanced management of forest lands to assure adequate supplies of timber and other forest goods and services. But the opportunities are large and the prospective benefits to the Nation will be substantial.

John R. McGuire,
Chief, Forest Service.

Preface

Over the past several decades the Forest Service of the U.S. Department of Agriculture has periodically reviewed the timber supply and demand situation and outlook in the United States. The objectives of these reviews are expressed in the authorization for the nationwide Forest Survey, contained in Section 9 of the McSweeney-McNary Forest Research Act of 1928, which directs the Secretary of Agriculture to cooperate with States and other agencies

> ". . . in making and keeping current a comprehensive survey of the present and prospective requirements for timber and other forest products in the United States, and of timber supplies, including a determination of the present and potential productivity of forest land therein, and of such other facts as may be necessary in the determination of ways and means to balance the timber budget of the United States. . ."

This report provides an analysis of the Nation's timber situation as of 1970 and the outlook under a number of economic and management alternatives. It represents the latest in a series of similar timber appraisals prepared by the Forest Service in the past.[1]

This new study includes statistical data as of 1970 on the current area and condition of the Nation's forest land, inventories of standing timber, and timber growth and removals by individual States. Information is also included on recent trends in forest land and timber resources, trends in utilization of the Nation's forests for timber and other purposes, and trends in consumption of wood products. Data are also presented on foreign sources of timber and foreign markets for U.S. products.

Projections of future demands for timber in the United States indicate market potentials under a range of economic and price assumptions. Projections of timber supplies point to prospective and potential availability of wood products with alternative levels of forest management and utilization, and alternative price trends.

These projections of timber demand and supply potentials from domestic and foreign sources are compared to identify prospective developments in timber prices, the outlook for supply problems in the wood-using industries, and possible impacts of changes in forestry policies and programs.

Many changes are taking place in the use of American forests. Demands for timber products have been increasing rapidly, but perhaps even more striking has been the growth in demand for recreational uses of forest areas and for management of forest cover to improve the quantity and quality of water yields, to improve wildlife habitat, and to preserve scenic values.

More and more areas in both public and private ownerships are being used exclusively or in part for such nontimber purposes. A major expansion in multiple-use management of forest lands, particularly on public holdings, also has put new constraints on traditional timber production and harvesting practices. The Nation's forests more than ever are being used for both commodities and services.

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[1] U.S. Department of Agriculture, Forest Service. The timber supply of the United States. USDA Forest Serv. Cir. 166, 24 p. 1909.

———Timber depletion, lumber prices, lumber exports, and concentration of timber ownership. Rep. on Senate Resolut. 311, 66th Congr., 2d sess. 71 p. (The Capper Report.) 1920.

——— A national plan for American forestry. Senate Doc. 12, 73rd Congr., 1st sess 2v., 1677 p. (The Copeland Report.) 1933.

——— Forests and national prosperity. USDA Misc. Publ. 668, 99 p. (The Reappraisal Report.) 1948.

——— Timber resources for America's future. USDA Forest Resource Rep. 14, 713 p. (The Timber Resources Review Report.) 1958.

——— Timber trends in the United States. USDA Forest Resource Rep. 17, 235 p. 1965.

A partial list of related reports concerned with the timber situation in the United States includes:

U.S. Department of Commerce and Labor, Bur. Corps. Summary of report of the Commissioner of Corporations on the lumber industry, Pt. I, Standing timber. 38 p. (The Bureau of Corporations Report.) 1911.

——— Part I, Standing timber (including summary). 301 p. 1913.

——— Part II, Concentration of timber ownership in important selected regions. 1914.

——— Part III, Land holdings of large timber owners (with ownership maps). 264 p. 1914.

U.S. Congress Joint Committee on Forestry. Forest lands of the United States. Senate Doc. 32, 77th Congr., 1st sess. 44 p. (The JCC Report.) 1941.

President's Materials Policy Commission. Resources for freedom, selected reports to the Commission, Vol. V. U.S. Government Printing Office, Washington, D.C. 1952.

Stanford Research Institute. America's demand for wood, 1929–1975. 404 p. Stanford, Calif. 1954.

Resources for the Future, Inc. Resources in America's future, patterns of requirements and availabilities, 1960–2000. 1017 p. Johns Hopkin Press, Baltimore, Md. 1962.

Commission on Population Growth and the American Future. Population, resources, and the environment, Vol. II, Economic aspects of population change, Vol. III, Population, resources and the environment. 337 p. 1972.

In this study an effort consequently has been made to view timber supply and demand in relation to use of forest resources for nontimber purposes. Only limited evaluations of demands for and supplies of these related uses of forest resources and users are currently available. Nevertheless, rising demands for nontimber purposes are important considerations in evaluating the current and prospective timber situation. Thus on National Forest lands, for example, future availability of timber has been estimated within the context of multiple-use plans which provide for balanced programs of development and use of all resources. Some allowances have been made for continuing transfers of timber-producing lands to other uses. On much of the forest land in farm and miscellaneous private ownerships it has been recognized that owners' objectives are primarily for purposes other than timber production and that timber harvests on such lands consequently may be limited.

In view of the many changes in both economic and environmental factors that have been occurring, a new look at timber supply and demand prospects is considered essential. This appraisal is designed to provide some of the basic input required for appraising the effectiveness of existing forestry programs, to indicate opportunities for economic development of timber resources, and to help evaluate the desirability of new or different action relating to timber production.

Specific recommendations for forestry programs —for forest development or for improving the economy of rural America, for example—lie beyond the scope of this study. This report is designed, rather, to identify and appraise changes occurring in the forest situation, and to provide some indication of the outlook for timber with and without changes in the way forests are managed and used.

Information on the Nation's timber situation and outlook is of far-reaching economic and environmental importance. Timber products make up nearly one-fifth of all industrial raw materials consumed in the United States. Processing of timber products supports thousands of establishments and millions of workers, many in rural areas and cities where timber is the principal support of the local economy.

Growing concern over prospective depletion of nonrenewable mineral resources, and the higher energy requirements and pollution impacts resulting from use of nontimber resources in lieu of wood products, also emphasize the growing importance of timber in the U.S. economy. Unlike most competitive products, wood is a renewable industrial raw material.

The analysis of resource supplies and demands presented in this report pertains only to the next few decades. For the longer run, well within the span of time it takes to grow trees, shortages of natural resources could become an increasingly serious issue. In appraising today's needs for forestry programs, some consideration therefore needs to be given to the probable situation beyond the period covered by this report.

Acknowledgments

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Projections and analyses of timber supply potentials in Chapter II was prepared for the East by Robert W. Larson and Mark Goforth. John H. Wikstrom prepared the projections for the Rocky Mountains, and Donald R. Gedney the projections for the Pacific Coast.

Additional principal contributors to the evaluation of timber management opportunities presented in Chapter III, included Robert N. Stone, Thomas H. Ellis, T. A. McClay, Thomas J. Mills, Clark Row, Charles A. Wellner, Clarence Brown, David Tackle, and Walker P. Newman, plus a number of participants in the Regional Offices and Experiment Stations of the Forest Service who contributed information and judgments. Examples of local management opportunities were prepared largely by: Joe P. McClure and Herbert A. Knight for the Southeast; Sam Guttenberg and Walter M. Anderson for the South; Allen L. Lundgren and Rolfe A. Leary for the North Central Region; and Donald F. Flora, Roger D. Fight, and Donald R. Gedney for the Pacific Northwest—in all cases assisted by cooperating staff members at these field locations. Information on utilization opportunities prepared by Experiment Station staffs were compiled for the report by Dean N. Quinney.

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Chapter V dealing with timber demand trends and projections was prepared under the direction of Dwight Hair, with contributions from Robert B. Phelps, James T. Micklewright, Thomas C. Marcin, Thomas G. Gill, William H. Reid, Maurice G. Wright, Charles W. Dane, Jerome F. Saeman, Clyde A. Fasick, Robert G. Knutson, A. Jeff Martin, David C. Baumgartner, and Gordon D. Lewis.

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Highlights

This study relates primarily to the long-run outlook for timber supplies and demands in the United States under changing economic and environmental conditions. Timber availability will have a direct bearing on the economic development of the Nation as well as availability of forest lands for nontimber and environmental purposes.

1. *Demands for industrial timber products in the United States have been increasing steadily, with a 65-percent rise in use of these products during the past three decades.*

Consumption of industrial wood products—such as lumber, woodpulp, plywood, etc.—increased 65 percent between 1942 and 1972 to an annual total of 125 million tons. In this period consumption of industrial roundwood (that is, all roundwood products except fuelwood) required to produce these wood products increased about 56 percent to 13.7 billion cubic feet in 1972. The difference in these trends for roundwood and industrial wood products consumption reflected more complete use of the timber harvested, with a resulting reduction of unused wood residues.

In the 1942–72 period, lumber consumption rose 27 percent. Use of round pulpwood climbed 157 percent, and consumption of veneer and plywood over 438 percent. On the other hand, use of fuelwood and minor products such as poles and posts declined.

2. *Further substantial increases in future demands for timber are expected.*

Projections of potential future demands for timber vary widely with such factors as economic growth and relative prices of timber products. A "medium" projection of possible future demand was based on the assumptions: (1) that the population of the United States will increase nearly 40 percent between 1970 and 2000 to 281 million people; (2) that real gross national product will grow at an average of 4.0 percent annually, or about 240 percent by 2000; and (3) that recent trends in technology and institutional factors will continue.

With prices of timber products relative to other materials at 1970 levels, this medium projection of U.S. demand for roundwood rises from a 1970 level of 12.7 billion cubic feet to nearly 23 billion cubic feet by the year 2000. Potential demand for softwoods rises from 9.7 billion cubic feet in 1970 to 15.8 billion cubic feet by 2000. Demand for hardwoods is projected to rise from 3.0 billion cubic feet in 1970 to 7.0 billion cubic feet in 2000.

With higher relative prices of timber products in the future—which timber demand-supply comparisons indicate can be expected—projected demands for roundwood are correspondingly lower. Thus, with rising relative prices of 1.5 percent per year above the 1970 trend level of lumber and somewhat smaller price increases for plywood, woodpulp, and other items, projected total timber demand by the year 2000 approximates 19 billion cubic feet. This latter projection includes increases in demand of 5 percent for saw logs between 1970 and 2000, 58 percent for veneer logs, and 130 percent for round pulpwood.

In terms of softwood sawtimber—of primary importance for lumber and plywood used in housing and many other markets—projected demand at 1970 prices rises from 47.6 billion board feet in 1970 to 73 billion board feet by 2000. With the specified rising prices, however, projected demand reaches 55 billion board feet in 2000—a rise of 16 percent.

Projected demand for hardwood sawtimber with rising prices increases from 12.3 billion board feet in 1970 to 19 billion board feet in 2000—a rise of 55 percent.

3. *Timber growth in the United States has been increasing as a result of recent forestry programs.*

The condition of timberlands in the United States has improved materially in recent decades, primarily because of expanding fire protection and some increase in tree planting and other forestry activities. As a result, net growth of both softwoods and hardwoods increased about one-third between 1952 and 1970 to a total of 10.7 billion cubic feet of softwoods and 7.9 billion cubic feet of hardwoods.

Roughly 60 percent of this total net growth of softwoods in 1970, or about 40 billion board feet, consisted of softwood sawtimber suitable for lumber and plywood. Hardwood sawtimber growth totaled 20 billion board feet in 1970.

Removals of softwood sawtimber as a result of timber harvesting and other factors exceeded net growth in 1970 by 18 percent. In the East removals were less than net growth but this was more then offset by an excess of removals over net growth in the West. Removals of hardwood sawtimber in 1970, on the other hand, were 24 percent less than net growth.

4. *Projected supplies of softwood sawtimber products potentially available from U.S. forests show limited increases with 1970 levels of management.*

Potential supplies of softwood timber from the Nation's forests—assuming 1970 levels of management, timber cutting practices and policies similar to those in recent years and only minor reductions in areas of commercial timberland—are estimated to increase about 31 percent by 2000, from 8.8 billion cubic feet in 1970 to about 11.5 billion cubic feet. This is a technical potential which may not be fully realized, however, because of factors of operability and owners' willingness to sell timber.

Thus in the case of softwood sawtimber—of particular importance for lumber, plywood and various other products—projections of economically available future supplies show limited changes from the 1970 level of output. Assuming relative prices of timber products remained at 1970 levels, for example, estimates of economically available supplies of softwood sawtimber are only slightly above the actual harvest of about 46.9 billion board feet in 1970. With increased prices of softwood lumber and plywood averaging 50 percent above 1970, projected supplies increase to over 53 billion board feet over the next decade, but then decline below the 1970 level.

5. *Supplies of hardwood timber are increasing although industrial use is limited by problems of quality and availability.*

The outlook for hardwoods is somewhat mixed in spite of the fact that removals of all sizes and species of hardwood timber in 1970 was some 25 percent less than total net growth.

Projections of available supplies of hardwood sawtimber over the next few decades—assuming 1970 levels of forest management and specified cutting rates—increase 66-percent, from an actual harvest of 12.3 billion board feet in 1970 to over 20 billion board feet by 2000. This approximates the projection of demand associated with 1970 prices.

Projected supplies of hardwood products, in cubic feet, under these same assumptions materially exceed potential demands at 1970 prices.

While these projections imply little or no increase in hardwood prices, there are practical limitations on amounts of timber available for sale and industrial use at any given time. To many owners of hardwood timberland use of the forest for recreation or other nontimber objectives is of primary importance. Problems of quality also are of special significance. Much of the growth and available supply of hardwoods are in small tree sizes or species for which markets are llimited; whereas the larger sizes of preferred species are in short supply in most areas. Other factors that could produce a tighter supply situation and higher prices include possible substitution of hardwoods for softwoods in production of woodpulp and certain other timber items.

6. *The outlook for timber supplies differs widely by ownerships and by regions.*

Nationwide, private holdings account for the major part of the commercial timberlands, including 14 percent ir forest industry and 59 percent in farm and miscellaneous private holdings. National Forests include about 18 percent of the total commercial timberlands and other public holdings 9 percent.

Timber harvests in 1970 reflected this pattern of ownership, with 48 percent of the 12.2 billion cubic feet of total roundwood harvested from U.S. forests coming from farm and miscellaneous private holdings. Forests industry lands supplied 28 percent of the total, National Forests 17 percent, and other public lands 7 percent. In the projections of supply the major changes in these proportions include a drop for forest industries and a corresponding increase for farm and miscellaneous private owners.

Southern forests provided about 45 percent of the Nation's timber harvests in 1970, compared with 32 percent for the Pacific Coast, and 23 percent for other sections of the United States.

In the South progress in fire control and other forestry activities has improved the timber situation to the point where it appears that with 1970 levels of management, softwood timber harvests could be increased gradually cn both National Forests and other lands by roughly 50 percent over the next few decades.

On the Pacific Coast, on the other hand, a marked decline in softwood sawtimber supplies of about 18 percent is projected in the 1970–2000 period as a result of reduced availability of timber from forest industry lands.

Sustained harvests of timber from western National Forests and other public lands at levels close to 1970 estimates of allowable harvests appear possible for some decades, although only with timber prices significantly in excess of 1970 levels. Also, allowable harvests on National Forests can be expected to drop shortly after the projection period, if not before, unless forest management and utilization of timber on these lands is intensified.

7. *Substantial increases in softwood timber prices appear necessary to balance potential timber demands with available timber supplies.*

With forest management continuing at 1970 levels, projected supplies of softwood sawtimber might balance the medium projection of timber demand with relative prices of softwood lumber and plywood in 1980 possibly 20 to 25 percent above the 1970 level, and possibly 50 to 60 percent higher in the year 2000. Related equilibrium prices for paper and board by 2000 are estimated to average roughly 15 to 20 percent above 1970.

Stumpage prices associated with these increases in prices of timber products, according to historical relationships, by 2000 could be expected to average more than double the level of prices in 1970.

Such prospective increases in prices for softwood lumber would be consistent with an average rise of 1.7 percent annually in lumber prices relative to the general price level over the past century. Relative prices of lumber leveled off in the period 1950–67—years marked by rapid improvements in productivity in logging and processing and by development of new sources of timber in western National Forests and in British Columbia.

Relative prices of softwood plywood declined dramatically during this recent period with adoption of new technology and equipment. Relative prices of pulp, paper, and board were quite stable. Nevertheless, the timber supply outlook with 1970 levels of management and utilization indicates new supply problems and shifts to higher price levels for all timber products.

8. *Supply and price problems appear most critical for softwood lumber and plywood, but all forest industries will be affected.*

Comparisons of projected timber demands and supplies indicate that problems of timber availability are likely to be most critical for softwood sawtimber used for lumber and plywood in housing, other construction, and various other markets.

The outlook for the pulp and paper industry is better than for lumber and plywood, largely because of the wide variety of species and qualities of timber that can be used for pulpwood, However, the tightening supply-demand situation for softwoods, and new developments such as installation of chipping headrigs, are leading to increased competition for available wood supplies and higher wood costs for all industries.

Producers of hardwood lumber and plywood who depend on the higher qualities and sizes of preferred species, such as white oak, walnut, maple, birch, and gum, also face serious supply problems and prospective increases in timber prices. On the other hand, substantial supplies of timber are prospectively available for industries producing hardwood products such as pallets, construction timber, railroad ties, or hardwood pulps.

9. *Demands for nontimber products and services and for environmental protection are of growing importance in the timber situation.*

Use of forest land for timber production is being increasingly affected by public desires for recreation and other nontimber uses. Sizable areas of public forest lands have been withdrawn from timber use for wilderness and scenic areas, although many of these are of relatively low site productivity for timber. Extensive areas of both private and public forest lands have been shifted to nontimber uses such as reservoirs, highways, airports, urban expansion, and recreational developments. Still other areas, particularly fertile bottomlands capable of producing quality hardwoods, have been cleared for crops and pasture.

Until recently, reversion of abandoned agricultural lands to forests more than offset such losses. Between 1962 and 1970, however, areas classified as commercial timberland declined about 8.5 million acres to a total of 500 million acres. Some continuing net losses of commercial timberland, averaging possibly 5 million acres per decade, have been assumed in this analysis.

Lands remaining in the commercial timberland category also are increasingly called on to supply nontimber goods and services as well as timber harvests. These demands, as well as new concern over protection of the natural environment, are leading to numerous modifications in timber harvesting and other forestry practices, particularly on public lands. It seems clear that management of forests for combinations of products and uses, especially those in public ownership, will be increasingly essential.

Such constraints on land use and management on public lands and to some extent on private forests, together with unforeseen transfers of forest lands to nontimber uses, could reduce timber harvests below the projections developed in this report. Impacts on timber prices and supplies of wood products would be correspondingly intensified.

It is also possible that raw material shortages could in time seriously constrain growth of the Nation's economy or interfere with the achievement of social goals such as improvement of housing. In such case forest recreation and other nontimber uses could also suffer as a result of efforts to alleviate materials shortages. Thus, success in supplying nontimber values and products may be influenced deeply by the effectiveness with which industrial raw material needs can be met. For such reasons, essentially all users of forest land have an interest in the timber outlook.

10. *A partial alternative in meeting prospective timber supply problems is to increase timber imports from Canada and other wood surplus countries. Rising exports of timber products, however, have been offsetting a substantial part of the increase in timber imports.*

About half a century ago the United States ceased to be self-sufficient in timber products and since then has depended increasingly on net imports from other countries. Imports of timber products reached a total of 2.9 billion cubic feet, roundwood equivalent, in 1972. This represented 19 percent of the total U.S. domestic and export demand for timber products.

Timber imports obtained largely from Canada made up about 19 percent of total U.S. supplies of lumber and 25 percent of total U.S. pulp and paper supplies in 1972. More than 60 percent of the hardwood plywood and veneer consumed in the United States was obtained from Southeast Asia and other tropical areas.

With rising prices of timber, imports from Canada and from tropical areas have been assumed to increase substantially over the next three decades, mainly in the form of softwood lumber, pulp and paper, and hardwood veneer and plywood. In time, however, rising world demands for timber and a general tightening of the world timber supply situation seem likely to limit such import potentials.

Exports of forest products also have increased substantially in recent years, in large part as a result of large Japanese purchases of logs and pulp chips, expanding world markets for kraft pulp and liner board, and continued exports of lumber. In 1972, about 9 percent of the total U.S. supply of timber products, or 1.3 billion cubic feet roundwood equivalent, was exported to various parts of the world. Along with prospective increases in timber imports in future years, some further increases in exports from the United States have been assumed.

Net imports in 1972 of 1.6 billion cubic feet made up nearly 11 percent of the total consumption of timber products in the United States. Net imports have been estimated to increase to around 2.8 billion cubic feet, roundwood equivalent, by 2000, with prices of lumber, for example, rising 1.5 percent per year. But such dependence on other countries, while important, appears to offer only a partial means of meeting the growing demands for timber products in the United States.

11. *Greater use of nonwood materials is a possible alternative, although this appears to have undesirable environmental and economic impacts.*

The relative importance of timber products in the U.S. economy has changed greatly over time as other raw materials such as steel, concrete, and aluminum have replaced or supplemented wood in various uses. With increased prices and insufficient supplies of timber, such continuing substitution can be expected.

While there are no immediate threats of shortages of wood substitutes, continued geometric growth in materials use, such as experienced in the past and in prospect in coming decades, will require enormous quantities of materials and entail serious environmental problems. Most competing products such as steel, aluminum, and plastics are derived from depletable resources—in contrast to timber which is renewable. Thus it is possible that the historical stability in relative prices of competing materials may be replaced by rising real costs of these materials.

Timber products can be produced with relatively low energy requirements for processing and low pollution impacts compared with most alternatives. Energy requirements for processing steel for framing exterior walls of houses, for example, amount to more than three times the energy required for processing lumber for the same use.

Production of competitive materials also ordinarily results in more serious air, water, or land pollution problems than in the case of wood products—both directly and indirectly through the generation of energy required for processing different materials. Wood products that are not recycled also have an important characteristic of being biodegradable.

If prices of timber products rise relative to prices of substitute materials, substitutes will, of course, be used. But in view of accelerating world use of raw materials, increased need for foreign exchange to finance imports of such materials, and higher energy requirements and pollution impacts than with use of timber products, greater dependence on substitutes for timber may not be a desirable alternative.

For such reasons long-run demands for wood, and related justifications of forestry programs, could increase considerably more than indicated by projections in this study.

12. *Better utilization of available supplies is a partial answer to problems of timber supply.*

Major progress has been made in recent years in the use of slabs, edgings, veneer cores, and other similar material from lumber and plywood operations for pulp, particleboard, and other products. In 1970, nearly three-fourths of all such material produced at sawmills and other primary processing plants, plus some additional material from secondary manufacturing plants, was utilized in this way. Such byproducts comprised 35 percent of the 72 million cords of pulpwood used by U.S. pulpmills in 1972.

Despite the progress made, unused plant residues still represent a sizable resource. In 1970, unused chippable material at primary manufacturing plants amounted to 0.4 billion cubic feet and all residues about 1 billion cubic feet (12.4 million cords). With prospective trends in timber prices and utilization practices, it has been assumed that most chippable residues and much of the fines will be utilized for pulp or particleboard within the next decade or so.

Large additional quantities of wood fiber, largely suitable for pulping, also are left in the woods each year as logging residues because of high costs of recovery and problems such as bark removal on limbs and fragmented material. In 1970, these residues included some 1.6 billion cubic feet of material from sound trees, plus at least this much material from other sources such as limbs, rough and rotten trees, and dead trees (a total of roughly 40 million cords). Environmental requirements and rising timber values can be expected to lead to better clean up and utilization of timber on harvested areas. But accelerated efforts to improve utilization on logging areas—along with expanded efforts to grow more timber—appear essential if rising pulpwood demands in future decades are to be met.

More of the timber killed by insects, fire, and other destructive agents, although widely scattered for the most part, also might be salvaged with higher prices and improved forest access. Such losses in 1970 included 11 billion board feet of softwood sawtimber.

Improving efficiency of wood utilization in manufacturing plants also would help extend timber supplies. It has been assumed on the basis of past trends that modernization of sawmills, for example, through better production methods and installation of newly available equipment such as high-strain, thin-kerf saws will result in increased lumber recovery from available logs of possibly 2 to 4 percent per decade. But much larger increases in recovery rates should be possible with rising timber values and faster application of improved technology.

Better sorting of logs to help insure use for the most valuable end product—lumber, plywood, or pulp—similarly could stretch available supplies of sawtimber for lumber and plywood.

Development and use of improved structural particleboards and some substitution of hardwoods for softwoods could further extend softwood sawtimber supplies. Wood products also could be used more efficiently in construction by better design and construction methods.

13. *Intensified forest management offers an important means of increasing timber supplies in the long run, while maintaining an acceptable forest environment.*

Sizable increases in timber growth and future harvests could be achieved in U.S. forests by increased investments to expand tree planting, stand improvement, protection, and other forestry practices. Most forest areas are not fully stocked with desirable timber and are growing at a much lower rate than is possible under intensified management. Fire, insects, and other destructive agents also cause losses that in effect nullify about one-fifth of total timber growth.

Opportunities for increasing future timber supplies by intensified management exist in all sections of the country and all classes of ownership. In the South, for example, timber growth currently averages about 45 cubic feet per acre annually, including only 104 board feet of sawtimber sized material. Large areas of plantations are yielding more than double this amount of growth. And there are millions of other acres where conversion from poor hardwood stands to pine stands, especially with use of genetically improved planting stock, would in time greatly increase available supplies of timber.

Similarly on the West Coast and other parts of the country there are large additional areas in Federal, State, industrial, and other private ownerships where timber supplies could be greatly increased by reforestation and by other practices such as precommercial thinnings and intermediate cutting in older age classes.

On nonindustrial private ownerships held by farmers and a wide variety of miscellaneous owners, timber growing efforts other than fire protection have been limited. Yet several million of these owners hold 59 percent of the timberlands in the United States that are considered suitable and available for timber production. Most of these owners are unwilling to invest in timber growing and many are reluctant to sell timber because of conflicts with other purposes.

Capturing a larger part of the very large potential for timber growing on these numerous holdings is technically sound and economically feasible, but will require substantial investments. On many ownerships public cost sharing and technical assistance appear necessary to achieve the increased growth that is estimated to be economically feasible to produce.

An initial analysis to illustrate management opportunities on National Forests and farm and miscellaneous private holdings indicated that increased investments of about $69 million annually could increase annual harvests of softwood sawtimber about 1.6 billion board feet by 1980 and and as much as 13 billion board feet by 2020. This analysis used as a criterion a minimum rate of return of 5 percent on additional investments, with prices of lumber and plywood assumed to average 30 percent above 1970 levels.

Additional promising opportunities for increased timber production also undoubtedly exist on other public and industrial ownerships, and in the use of genetically improved planting stock, fertilization, or other new technology.

Environmental management to assure balanced production of nontimber uses and protection of the environment as well as timber crops will be essential, particularly on public forest lands and to an increasing degree on private lands as well.

14. *A combination of efforts could help supply growing demands for timber products while simultaneously providing for nontimber uses and protection of the environment.*

In summary, if increased supplies of timber for a growing Nation are desired, a number of things could be done to increase and extend timber supplies, including:

- More complete utilization of logging residues, plant residues, and trees lost by mortality, and greater use of recycled fibers.
- Greater use of available equipment and manufacturing processes to increase output of lumber and other products from available log supplies.
- Better allocation of available timber to assure use for optimum end products.
- Some increase in dependence on imports of timber products.
- More intensive management of all classes of forestlands suitable for timber management, by road construction, commercial thinning and salvage, reforestation with genetically improved planting stock, timber stand improvement, use of fertilizers, and better protection against fire, insects and other destructive agents—while simultaneously managing lands to assure a balance with other uses and environmental protection.
- Continued development and application of new technology in timber growing, in processing of timber products, and in consumer use of wood products.

Substantial public and private investments will be necessary for such measures to increase timber supplies significantly and to improve utilization of available timber supplies. Such measures are both technically and economically feasible. They can be carried out while maintaining a balance with environmental uses of the forest.

CHAPTER I

RECENT TRENDS IN FOREST LAND AND TIMBER RESOURCES

This chapter presents information on recent trends in the area and condition of commercial timberlands by classes of ownership; timber growth and mortality; the volume, quality, location, and ownership of standing timber; the output of roundwood timber products; and output and use of plant residues.[1]

This presentation is primarily concerned with national trends, although considerable information is also presented for the major sections of the country—North, South, Rocky Mountains, and Pacific Coast (fig. 1). Detailed regional and State statistics on forest land and timber resources as of 1970 are presented in Appendix I; these data have been updated from statistical information published by the Forest Service in Forest Survey reports for individual States.

FOREST LAND AREAS

Some 754 million acres, or one-third of the 2.3 billion acres of land in the United States, were classified as forest lands in 1970 (table 1). These vary from highly productive forest areas intensively managed for timber production to areas incapable of yielding industrial wood because of adverse conditions of climate, soil, or elevation.

Commercial Timberland

Two-thirds of the Nation's forest land in 1970, or about 500 million acres, was classed as commercial timberland—i.e., both available and suitable for growing continuous crops of saw logs or other industrial timber products (fig. 2). These areas also provide recreation, wildlife habitat, watershed protection, and some forage for livestock.

Areas classed as commercial timberland vary widely in timber producing potentials, but all are judged capable of growing at least 20 cubic feet of timber per year, and suitable now or prospectively for timber harvesting. Although landowner intentions have a major bearing on use of land for timber production, forest areas were excluded from the commercial category only when of low productivity or actually reserved or developed for nontimber uses.

Nearly three-quarters of the commercial timberland is located in the eastern half of the United States, about equally divided between the North and South sections (fig. 3). These forests cover 80 percent of the total land area in New England, and more than half of the area along the Atlantic

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[1] For definitions of terms used in this report, see Glossary.

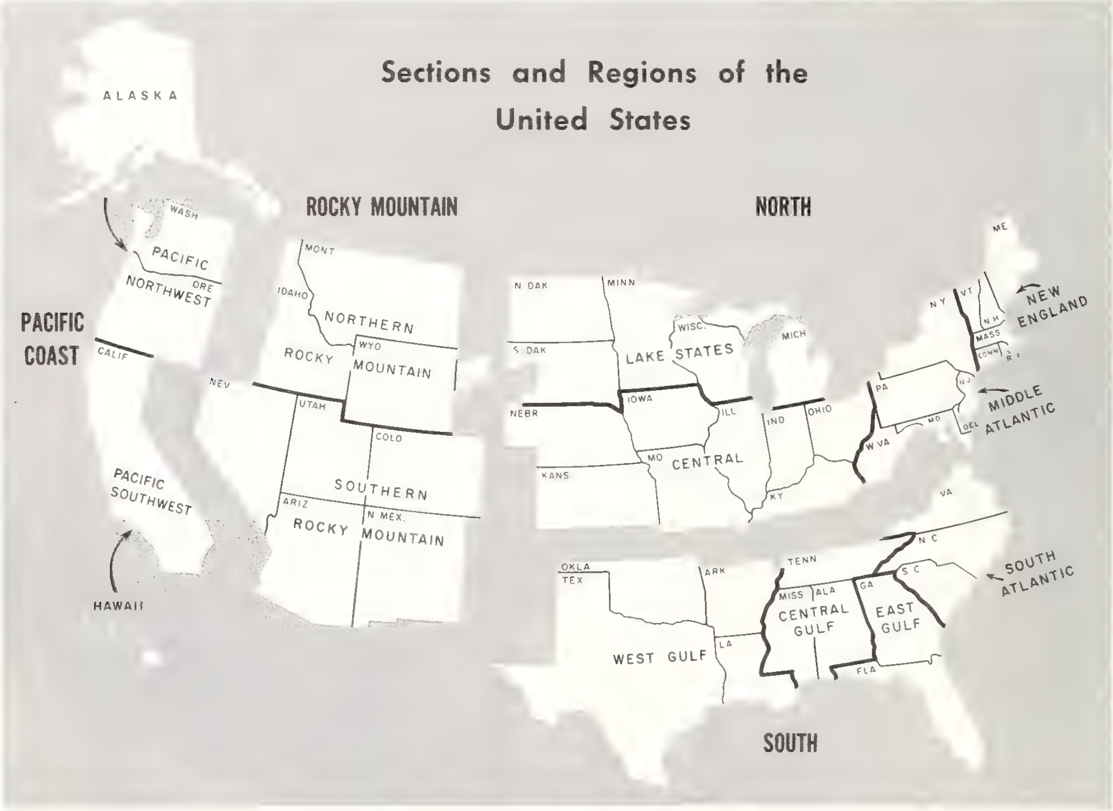

Figure 1

TABLE 1.—*Land area of the United States, by type of land and section, January 1, 1970*

Type of land	Total United States		North	South	Rocky Mountains	Pacific Coast
	Area	Proportion				
	Million acres	*Percent*	*Million acres*	*Million acres*	*Million acres*	*Million acres*
Commercial timberland	499. 7	22. 0	177. 9	192. 5	61. 6	67. 6
Other forest land:						
Productive-reserved	17. 2	. 8	4. 3	1. 7	7. 9	3. 3
Deferred	2. 7	. 1	----------	----------	2. 3	. 4
Unproductive	233. 9	10. 3	4. 2	17. 6	66. 5	145. 6
Total	253. 9	11. 2	8. 6	19. 3	76. 6	149. 3
Total forest land	753. 5	33. 2	186. 5	211. 9	138. 2	216. 9
Cropland	427. 0	18. 8	260. 2	103. 7	37. 4	25. 7
Other land	1, 089. 5	48. 0	181. 4	197. 2	379. 7	331. 3
Total land area	2, 270. 1	100. 0	628. 0	512. 8	555. 3	573. 9

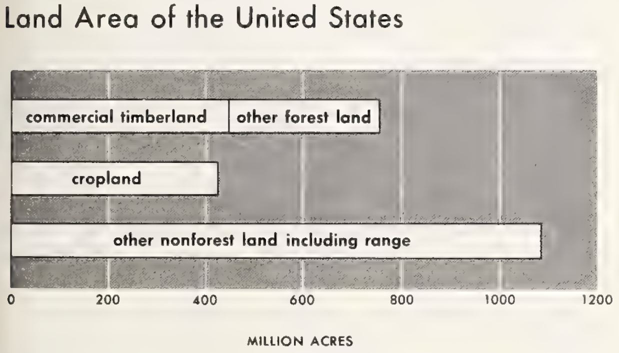

Figure 2

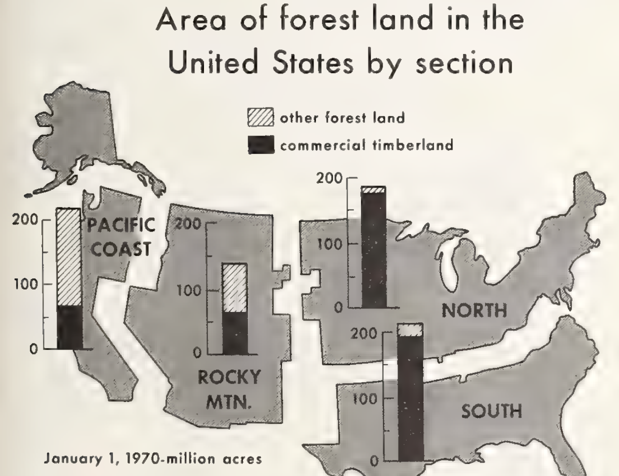
Area of forest land in the United States by section
other forest land
commercial timberland
PACIFIC COAST
ROCKY MTN.
NORTH
SOUTH
200
100
0
January 1, 1970-million acres

Figure 3

Coast. In the Central region, about 15 percent of the total land area is in the commerical timberland category.

The one-quarter of the Nation's commercial timberland located in the West is concentrated in the Pacific Coast States of Oregon, Washington, and California, and in the Rocky Mountain States of Montana, Idaho, and Colorado.

Other Forest Lands

Additional areas of productive timberland in public ownership on which timber harvesting is excluded have been classed as "reserved" areas. These totaled 17.2 million acres in 1970. Also, about 2.7 million acres of productive timberland in National Forests were classed as "deferred" in 1970 while under study for possible inclusion in the wilderness system.

The remaining one-third of the total forest land—some 234 million acres—includes lands of low productivity for timber, that is, generally of less than 20 cubic feet per acre per year of timber growth capacity. These areas largely support stands of pinyon-juniper, woodland-grass, chaparral, subalpine forests, or forests in the interior of Alaska.

As in the case of commercial timberlands, these other forests are of considerable importance for nontimber uses, such as recreation, watershed protection, wildlife habitat, and livestock production. The timber on these lands, as well as on "nontimber" lands, also supply limited quantities of roundwood products.

The interior of Alaska contains an estimated 106 million acres of forest land, or about 32 percent of Alaska's total land area. An estimated 22.5 million acres of these forests have a growth potential in excess of 20 cubic feet per acre. However, because of geographic and economic remoteness, none of the forest land in the interior of Alaska has been included in the statistics for commercial timberland, as in similar previous timber appraisals.

The better stands of timber in the interior of Alaska include cottonwood along major streams and areas of spruce and white birch. For the most part timber growth is limited by permafrost, poor drainage, and short growing seasons. Because of a history of frequent forest fires, most interior forests are also relatively young and occur in a patchwork of mixed age classes and types. Quaking aspen and paper birch usually seed in promptly after fires, but both are short-lived species and in time are usually succeeded by spruce.

White spruce is the most important softwood species, accounting for 81 percent of the total sawtimber volume in interior forests and a major part of the volume of smaller pulpwood size timber. Total timber inventory volumes on the 22.5 million acres of the more productive forest lands was estimated at 14.3 billion cubic feet—roughly equivalent to 2.2 percent of timber inventories on commercial timberland in the United States.

Development of forest industries in interior Alaska has been limited by lack of access, low timber volumes per acre, small size of trees, low product values, and difficult logging conditions. Divided ownership among the Federal Government, State of Alaska, natives, and other private individuals may be a constraint in some areas. Environmental factors and ecological stability also will represent highly important factors in the development of forests in interior Alaska. In the coastal portion of Alaska much of the allowable harvest on commercial timberlands has been committed for the support of pulp and lumber production.

Trends in Areas of Commercial Timberland

The 500 million acres of land classed as commercial timberland in 1970 was 8.4 million acres less than estimated for 1962 (table 2). These and other data suggest that the long rise in commercial timberland areas resulting from agricultural land abandonment in the eastern United States has now been reversed.

Recent declines in commercial timberland were largely in the South and Rocky Mountains. Much of the reduction in the West, especially in the Rocky Mountains, reflected shifts of public lands in National Forests to reserved or deferred status in response to growing demands for public recreational uses. Some was the result of increased use of forest land for roads and urban expansion.

In the South, much clearing of commercial timberland for soybean and other crop production took place in recent years, particularly in hardwood forest areas of the Mississippi River floodplain. In addition, extensive areas of forested uplands were converted to pasture for the South's growing cattle industry. In all regions, sizable areas of forest land also have been taken over for suburban development, highways, reservoirs, and other nontimber uses.

The estimates of net changes in timberland area such as shown in table 2 do not measure directly impacts of land-use shifts on timber

TABLE 2.—*Area of commercial timberland, by region, 1952, 1962, and 1970*

[Thousand acres]

Region	1952	1962	1970	Change 1962-1970
New England	30, 935	31, 878	32, 367	+488
Middle Atlantic	42, 098	46, 737	49, 685	+2, 947
Lake States	52, 604	51, 530	50, 841	−690
Central	44, 559	44, 942	45, 008	+66
Total North	170, 198	175, 089	177, 901	+2, 812
South Atlantic	46, 962	47, 911	48, 463	+551
East Gulf	42, 104	43, 128	41, 334	−1, 794
Central Gulf	49, 497	53, 361	51, 454	−1, 907
West Gulf	53, 518	55, 504	51, 291	−4, 214
Total South	192, 082	199, 905	192, 542	−7; 364
Pacific Northwest	50, 589	50, 407	49, 713	−694
Pacific Southwest	18, 216	18, 132	17, 909	−223
Northern Rocky Mountain	38, 337	38, 792	36, 669	−2, 124
Southern Rocky Mountain	25, 554	25, 810	24, 963	−848
Total West	132, 696	133, 141	129, 254	−3, 888
All regions	494, 978	508, 137	499, 697	−8,440

Note: Data for 1952 and 1962 as published in early reports have been revised to insure comparability with 1970 definitions and local specifications of commercial timberland.

resources. Agricultural acreage that is abandoned and reverts to forest usually remains understocked for many years, except for areas planted to trees. Timberlands shifted to other uses, on the other hand, generally contain timber inventories that are either reserved or largely destroyed as a part of changes in land use.

Net changes also are often much smaller than areas moving into and out of commercial status. Thus in Florida, for example, about 1.7 million acres of forested lands were shifted to agriculture, urban, and other uses during the 1959–70 period, while 0.7 million acres of farm land reverted to forest—a net loss of forest land of about a million acres.

Ownership of Commercial Timberlands

Largely as a result of historical policies which encouraged transfer of public domain lands to private ownership, about 73 percent of all commercial timberlands was privately owned in 1970. About 27 percent was in Federal, State, and other public holdings (table 3.)

Farm and miscellaneous private lands.—Commercial timberlands held by business and professional people, wage and salary workers, housewives, railroad, mining, and other corporations, and other nonfarm owners represent the largest class of forest ownership. In 1970, these owners held 165 million acres, or 33 percent of the total area of commercial timberland. Another 26 percent was classed as owned by farmers.

Many of the farm and miscellaneous private holdings include highly productive timber sites, and most are close to markets for timber products. These ownerships consequently have long been of major importance as a source of timber supplies for the wood-using industries. Nearly half of these timberlands were in the South in 1970 and most of the remainder in the North.

Since 1952 the combined area of farm and miscellaneous ownership has not shown much change (fig. 4; Appendix I, table 2). However, farm ownership dropped about 42.5 million acres between 1952 and 1970, while miscellaneous private ownerships increased about the same amount. Farm abandonment and a decline in rural populations has typically been associated with sales of land to nonfarm or industrial owners.

Forest industry ownerships.—The 67 million acres of commercial timberland in forest industry holdings in 1970—about 14 percent of the total—included some of the Nation's most productive timber growing areas. About 52 percent of these industrial lands were in the South, and 26 percent in the North. Most of the remaining areas were on the Pacific Coast, generally including the more productive lower elevation lands.

In the 1952–70 period, areas of commercial timberland in forest industry ownerships increased 13 percent—close to 8 million acres. Much of the increase was in the South where wood-using companies have been actively acquiring forest lands. A substantial part of the added acreage was purchased from farm and miscellaneous owners.

Forest industries have also turned to leasing and long-term cutting contracts to supplement fee ownership. Thus in the South, an estimated 9 million acres of commercial timberlands in nonindustrial ownerships were managed by the forest industries in 1970.

National Forest lands.—Some 92 million acres of commercial timberlands, or 18 percent of the U.S. total, were in National Forests in 1970. These forests are located largely in the Rocky Mountain and Pacific Coast sections. Most are

TABLE 3.—*Area of commercial timberland in the United States, by type of ownership and section, January 1, 1970*

Type of ownership	Total United States		North	South	Rocky Mountains	Pacific Coast
	Area	Proportion				
Federal:	*Thousand acres*	*Percent*	*Thousand acres*	*Thousand acres*	*Thousand acres*	*Thousand acres*
National Forest	91, 924	18	10, 458	10, 764	39, 787	30, 915
Bureau of Land Management	4, 762	1	75	11	2, 024	2, 652
Bureau of Indian Affairs	5, 888	1	815	220	2, 809	2, 044
Other Federal	4, 534	1	963	3, 282	78	211
Total Federal	107, 109	21	12, 311	14, 277	44, 699	35, 822
State	21, 423	4	13, 076	2, 321	2, 198	3, 828
County and municipal	7, 589	2	6, 525	681	71	312
Forest industry	67, 341	14	17, 563	35, 325	2, 234	12, 219
Farm	131, 135	26	51, 017	65, 137	8, 379	6, 602
Miscellaneous private	165, 101	33	77, 409	74, 801	4, 051	8, 840
All ownerships	499, 697	100	177, 901	192, 542	61, 632	67, 622

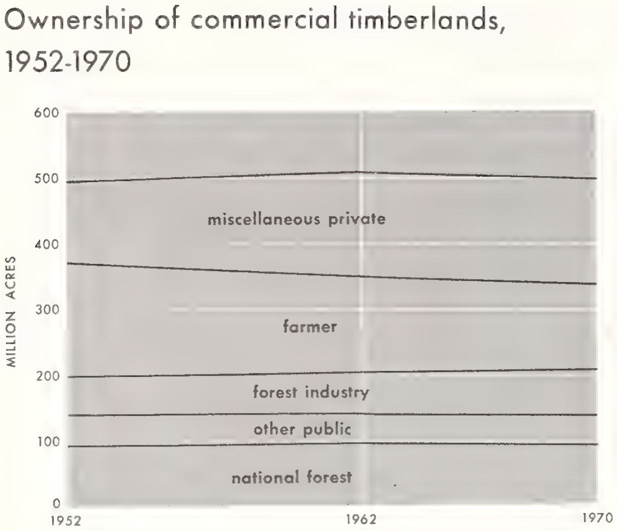
Ownership of commercial timberlands, 1952-1970

Figure 4

of relatively low site quality and located at higher elevations, but these forests nevertheless contain a substantial part of the Nation's timber inventory, as pointed out in a later section of this chapter.

Since 1962 areas in National Forests classed as commercial timberland have been reduced about 3 million acres. These reductions were mainly in the Rocky Mountain section, and mainly included lands selected for study as possible inclusions in the wilderness system. Since 1970 some additional areas also have been added to this deferred classification.

Some 5 million acres of the National Forest lands included in commercial timberland in 1970 were classed as "unregulated," and were not included in projecting available timber supplies. On these lands the amount and timing of future harvests are uncertain because of economic considerations or a lack of acceptable and economic logging systems.

Other public lands.—Federal lands other than National Forests made up 3 percent of all commercial timberlands in 1970. Lands in western Oregon administered by the Bureau of Land Management, and lands administered by the Bureau of Indian Affairs, were of particular importance in this group. State, county, and municipal forests made up 6 percent of the total. Many of these latter holdings were located in the Lake States, largely consisting of lands that were cutover and reverted through tax delinquency to public ownership during the depression years of the 1930's.

Forest Type Groups

Over half of all commercial timberlands in the United States in 1970 was occupied by eastern hardwood forest types [2] (table 4). Softwood types made up 42 percent, western hardwoods 3 percent, and nonstocked areas 4 percent, of all commercial timberlands.

Eastern hardwood forests.—Oak-hickory stands, stretching from southern New England to Texas,

TABLE 4.—*Area of commercial timberlands in the United States, by forest type groups, 1970*

Type group	Total area	Proportion of total
EASTERN TYPE GROUPS		
	Thousand acres	*Percent*
Softwood types:		
Loblolly-shortleaf pine	52, 832	10. 7
Longleaf-slash pine	18, 315	3. 7
Spruce-fir	18, 913	3. 8
White-red-jack pine	12, 168	2. 5
Total	102, 228	20. 7
Hardwood types:		
Oak-hickory	111, 861	22. 6
Oak-pine	35, 028	7. 1
Oak-gum-cypress	30, 630	6. 2
Maple-beech-birch	31, 140	6. 3
Elm-ash-cottonwood	24, 728	5. 0
Aspen-birch	20, 484	4. 1
Total	253, 871	51. 3
Nonstocked	14, 343	2. 9
Total East	370, 442	74. 9
WESTERN TYPE GROUPS		
Softwood types:		
Douglas-fir	30, 788	6. 2
Ponderosa pine	27, 964	5. 6
Fir-spruce	17, 830	3. 6
Lodgepole pine	13, 235	2. 7
Hemlock-Sitka spruce	10, 819	2. 2
Larch	2, 743	. 5
White pine	829	. 2
Redwood	803	. 2
Total	105, 011	21. 2
Hardwood types	12, 818	2. 6
Nonstocked	6, 379	1. 3
Total West	124, 208	25. 1
All groups	[1] 494, 650	100. 0

[1] Not including 5 million acres of "unregulated" commercial timberlands on National Forests in the Rocky Mountain States.

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[2] Forest types describe assocations of tree species, which in turn reflect factors of site, climate, and stand history. The forest type groups presented in this report are combinations of more than 80 local forest types traditionally used for forest management purposes. A map showing location of major forest types is for sale ($1.50) by the U.S. Geological Survey, Washington, D.C. 20242, as Sheet No. 182.

represent the most widespread timber type group, accounting for about 23 percent of all commercial timberlands in 1970 (fig. 5). Much of this type group now occurs on abandoned farm lands and in mountain areas. Many stands include large proportions of less desirable species such as post oak, black oak, chestnut oak, and blackjack oak. Some local types, however, are comprised of yellow-poplar and other desirable species.

The oak-pine type, which covered 14 percent of the eastern hardwood area in 1970, was mainly concentrated in the South. This type largely includes residual hardwoods left after cutting the merchantable pine trees from mixed pine-hardwood forests. In the last few decades many oak-pine stands have been converted to pine stands by killing or cutting hardwoods, followed in many cases by planting pines.

Oak-gum-cypress forests include such valuable species as sweetgum, cherrybark oak, tupelo, and baldcypress, as well as poorer species. These types occupied about 12 percent of the hardwood forest area in the East in 1970. Nearly all of this type occurs in the Mississippi Delta and other southern river bottoms where sites are of high productivity.

Maple-beech-birch forests are found mainly on upland sites in the New England, Middle Atlantic, and Lake States regions. Elm-ash-cottonwood types are largely concentrated in bottomlands in the Central and Lake States regions. Aspen-birch types are found chiefly in the Lake States region. This type is composed of relatively short-lived pioneer species that have taken over large areas following logging and fires.

Forest type groups in the United States, 1970

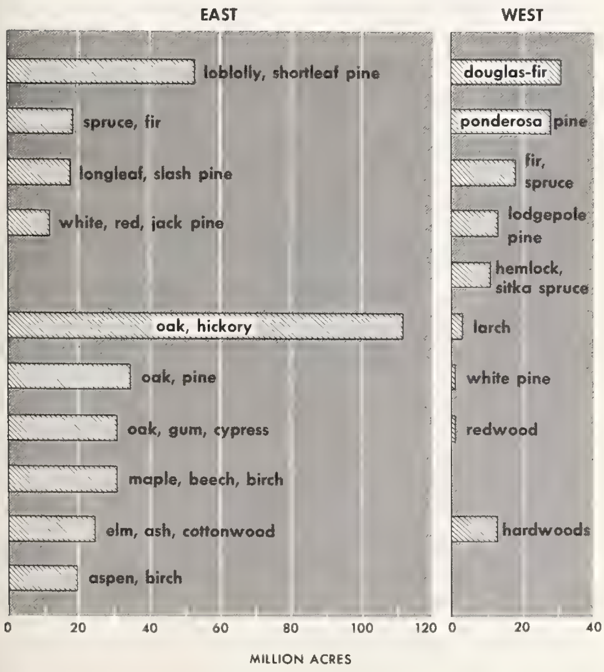

Figure 5

Eastern softwood forests.—Southern pine type groups made up a little more than 14 percent of the Nation's commercial timberlands in 1970. These types are concentrated on the Coastal Plain and Piedmont extending from New Jersey to Texas. In 1970 harvests of southern pine made up more than one-fourth of the total timber harvest in the United States.

Spruce-fir and white-red-jack pine types in the Lake States and Northeast covered about 6 percent of all commercial timberlands in 1970. As in the case of southern pines, these forests also support substantial local industries.

Western forests.—In the West about 85 percent of the commercial timberland supports softwood types. Douglas-fir and ponderosa pine types each make up about 6 percent of the total commercial timberland in the United States, and other western softwood type groups 9 percent. Most Douglas-fir areas occur on the Pacific Coast west of the Cascade Range where sites generally are highly productive. Douglas-fir also occurs in California and the Rocky Mountains, frequently on moderatly productive sites and mixed with other coniferous species.

The ponderosa pine type occupies a large acreage in eastern Oregon and Washington and in 1970 was also the most extensive commercial forest type in California and the Rocky Mountains.

Recent trends in forest types.—Shifts in land use patterns and natural succession have caused many important changes in forest type areas. Thus bottomland hardwood forests were reduced about 20 percent between 1962 and 1970 by clearing of forest land along the deltas of the Mississippi River and its tributaries for farm crops. For many years forests of the oak-gum-cypress group in this area have supplied a major share of the Nation's quality hardwood sawtimber.

Many changes have also been apparent in areas formerly supporting Douglas-fir. Red alder, other hardwoods, or western hemlock have taken over sizable areas after harvesting of the softwood stands. Western hardwood types thus increased almost 2 million acres between 1962 and 1970. Industry may be able to increase utilization of alder and other hardwoods, as in the case of aspen in the Lake States, but at present most alder stands offer little value compared to Douglas-fir.

Forest Site Productivity

Because of differences in such factors as soil fertility, moisture, slope, aspect, and elevation, there are considerable variations in timber-growing

TABLE 5.—*Area of commercial timberland in the United States, by site productivity class and by section, 1970*

Productivity class (cubic feet per acre per year)	Total United States		North		South		Rocky Mountains		Pacific Coast	
	Million acres	*Percent*	*Million acres*	*Percent*	*Million acres*	*Percent*	*Million acres*	*Percent*	*Million acres*	*Percent*
120 or more	52	10.4	10	5.5	13	7.0	5	8.4	24	34.9
85 to 120	116	23.5	39	22.1	53	27.8	8	13.8	16	23.0
50 to 85	195	39.5	69	38.8	90	46.5	14	24.5	23	33.9
20 to 50	131	26.6	60	33.6	36	18.7	30	53.3	6	8.2
All classes	[1] 495	100.0	178	100.0	192	100.0	57	100.0	68	100.0

[1] Not including 5 million acres in National Forests in the Rocky Mountains classed as "unregulated" commercial timberlands.

potentials, and responses to cultural practices, on the Nation's commercial timberlands.

About 10 percent of all commercial timberlands were classed as site 120 or more, that is, capable of producing 120 cubic feet or more per acre per year in fully stocked natural stands (table 5). (Under intensive management more timber can be produced than indicated by such figures for natural stands.) Nearly half of this highly productive land is in the Pacific Coast section, largely supporting Douglas-fir, hemlock-Sitka spruce, and western hardwoods. Each of the other sections also contain some of this high-site land.

Nearly two-thirds of the total area of commercial timberland is in the 85 to 120 and the 50 to 85 cubic foot site classes. About half of this acreage is in the South.

The remaining area of 20 to 50 cubic foot growth potential makes up more than a quarter of all commercial timberlands. This class of land provides limited response to timber management activities but often yields important values for grazing, recreation, or other nontimber uses. These lower-site lands are mostly in eastern areas such as the Appalachians, and in the Rocky Mountains where this site class makes up about half of that section's commercial timberland.

A relatively large proportion of the better sites above 85 cubic feet are in forest industry ownerships. The National Forests and other public ownerships have relatively high proportions of the poorer sites of less than 50 cubic feet potential.

Timber Stocking

The potential yields indicated by site productivity classifications are generally not realized, even though practically all commercial timberlands in 1970 were occupied to some extent by some type of tree cover, and many forests were fully stocked or even overstocked in terms of all live trees.

Illustrative data for a number of sample hardwood forest areas indicated, however, that only a fifth of the land supported desirable trees of good form, vigor, and preferred species. Growing stock of acceptable trees, and trees classed as rough and rotten, made up the remaining tree stocking. An estimated 90 percent of the land in these sample areas would require cultural treatments such as cull tree removal or thinnings to achieve a high level of output of merchantable timber and thus approach the yield potentials indicated by indexes of site productivity.

Stand-Size Classes

The distribution of forest areas by stand-size classes largely reflects the recency of timber harvesting and other factors such as fires or reversion of farm land to forest. Stand size is also indicative of prospective supplies of industrial timber, and a basic factor in the planning of timber management.

About 44 percent of all commercial timberlands supported sawtimber stands in 1970 (table 6). Poletimber stands made up 26 percent, and seedling and sapling stands 27 percent, with some 4 percent classed as nonstocked.

Sawtimber stands made up a sizable part of the total area in the South and in the North, even though most forests in these sections have been cutover one or more times. Most of these eastern sawtimber stands are relatively young and composed of trees in the lower part of the sawtimber-size range.

Much larger proportions of western forests supported sawtimber stands, including considerable old-growth areas that have never been cut. Stands on the Pacific Coast contain most of the large-size, high-quality sawtimber remaining in the United States.

Wide differences in timber volumes per acre are also illustrated by data in table 7. Nearly half of all commercial timberlands supported less than 1,500 board feet per acre in 1970. Only 23 percent had inventory volumes of more than 5,000 board feet per acre.

TABLE 6.—*Area of commercial timberland, by stand-size class and section, 1970*

Stand-size class	Total United States		North	South	Rocky Mountains	Pacific Coast
	Area	Proportion				
	Million acres	*Percent*	*Million acres*	*Million acres*	*Million acres*	*Million acres*
Sawtimber stands	215. 9	43. 6	59. 0	74. 0	36. 6	46. 3
Poletimber stands	126. 7	25. 6	60. 2	46. 2	12. 1	8. 3
Seedling and sapling stands	131. 4	26. 6	49. 2	67. 6	5. 2	9. 3
Nonstocked areas	20. 7	4. 2	9. 6	4. 8	2. 7	3. 7
All classes	[1] 494. 7	100. 0	177. 9	192. 5	56. 6	67. 6

[1] Not including 5 million acres of "unregulated" commercial timberland on National Forests in the Rocky Mountain States.

TABLE 7.—*Area of commercial timberland, by sawtimber volume classes and section, 1970*

Sawtimber volume class (board feet per acre)	Total United States [1]		North		South		Rocky Mountains		Pacific Coast	
	Million acres	*Percent*	*Million acres*	*Percent*	*Million acres*	*Percent*	*Million acres*	*Percent*	*Million acres*	*Percent*
Less than 1,500	243	49	114	64	103	53	14	25	12	18
1,500 to 5,000	138	28	49	28	62	32	16	29	11	16
More than 5,000	114	23	15	8	28	15	26	46	45	66
All classes	495	100	178	100	193	100	57	100	68	100

[1] Not including 5 million acres of "unregulated" commercial timberland on National Forests in the Rocky Mountain States.

Somewhat more than half of all sawtimber stands were classed as softwood types (fig. 6). Poletimber and seedling and sapling stands, on the other hand, included much larger proportions of hardwood types.

Stand-size classes and type groups, 1970

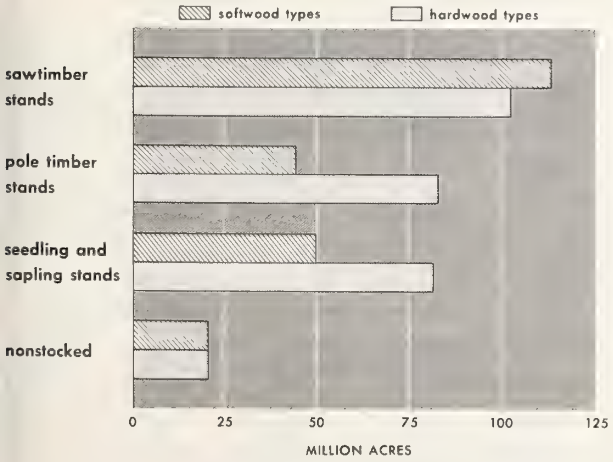

Figure 6

Commercial timberlands classed as "nonstocked" in 1970 (that is, with less than 10 percent of the area occupied by growing stock trees) amounted to about 21 million acres. These were widely distributed in all sections.

TIMBER GROWTH

Net annual growth of timber (that is, total annual growth less volumes of trees dying annually) is of major interest in areas with predominantly young-growth forests as in the eastern United States as a general indication of the present or prospective capability of forest lands to supply wood products. In old-growth forests of the West, however, where net growth is usually negligible because of heavy mortality, available inventories of standing timber rather than net growth will determine allowable harvests for some time to come.

Recent Trends in Timber Growth

The rise in net annual growth of timber illustrates a major success story in American forestry. In response to programs of forest fire control, tree planting, and other forestry measures, net annual growth of softwoods and hardwoods combined increased 18 percent between 1952 and 1962, and a further 14 percent between 1962 and 1970 (table 8). This strong upward trend occurred in both softwoods and hardwoods, and for both sawtimber and all growing stock.

Net growth has been rising in all regions, although softwood sawtimber in the South and hardwood sawtimber in the North showed the largest increases (table 9). There is of course considerably more commercial timberland in the East than in the West, and eastern stands are essentially all young growth where mortality is relatively low. In the West, sizable areas still support old growth in which mortality nullifies much of the total growth.

About two-thirds of the total sawtimber growth of nearly 60 billion board feet in 1970 was on

TABLE 8.—*Net annual growth of growing stock and sawtimber on commercial timberland, by softwoods and hardwoods, and by section, 1952, 1962, and 1970* [1]

GROWING STOCK—BILLION CUBIC FEET

Section	All species			Softwoods			Hardwoods		
	1952	1962	1970	1952	1962	1970	1952	1962	1970
North	4.1	4.9	5.5	1.1	1.2	1.4	3.0	3.6	4.2
South	6.3	7.5	8.6	3.6	4.5	5.4	2.7	3.0	3.2
Rocky Mountains	1.2	1.3	1.4	1.1	1.2	1.3	.1	.1	.1
Pacific Coast	2.3	2.7	3.1	2.0	2.3	2.6	.3	.4	.5
Total	13.9	16.4	18.6	7.8	9.3	10.7	6.1	7.1	7.9

SAWTIMBER—BILLION BOARD FEET

Section	All species 1952	All species 1962	All species 1970	Softwoods 1952	Softwoods 1962	Softwoods 1970	Hardwoods 1952	Hardwoods 1962	Hardwoods 1970
North	9.4	11.5	13.7	2.4	2.8	3.6	7.0	8.6	10.1
South	21.2	24.3	28.0	13.6	16.7	20.1	7.6	7.6	7.9
Rocky Mountains	4.3	4.6	5.1	4.2	4.5	4.9	.1	.1	.1
Pacific Coast	10.3	11.9	13.1	9.4	10.7	11.6	.9	1.2	1.5
Total	45.1	52.3	59.9	29.5	34.7	40.3	15.6	17.6	19.7

[1] Data may not add to totals because of truncating.

Note: Data for 1952 and 1962 differ from data published in earlier reports because of adjustments based on newer information from remeasured Forest Survey plots. Data for all years are "trend level" estimates.

TABLE 9.—*Change in net annual growth of growing stock and sawtimber on commercial timberland, by softwoods and hardwoods, and by section, 1962 to 1970*

GROWING STOCK

Section	All species		Softwoods		Hardwoods	
	Million cu. ft.	*Percent*	*Million cu. ft.*	*Percent*	*Million cu. ft.*	*Percent*
North	+664	+14	+144	+12	+519	+14
South	+1,155	+15	+920	+21	+235	+8
Rocky Mountains	+50	+4	+44	+4	+6	+8
Pacific Coast	+345	+13	+261	+11	+84	+22
Total	+2,214	+14	+1,369	+15	+844	+12

SAWTIMBER

Section	All species *Million bd. ft.*	All species *Percent*	Softwoods *Million bd. ft.*	Softwoods *Percent*	Hardwoods *Million bd. ft.*	Hardwoods *Percent*
North	+2,218	+19	+787	+28	+1,431	+17
South	+3,735	+15	+3,428	+21	+307	+4
Rocky Mountains	+451	+10	+431	+9	+38	+35
Pacific Coast	+1,243	+10	+976	+9	+267	+22
Total	+7,646	+15	+5,603	+16	+2,043	+12

softwood species. Roughly half of the softwood growth was comprised of southern pines and 16 percent of Douglas-fir (Append. I, tables 23 and 24).

The one-third of the total growth that was on hardwoods included growth of both preferred species such as select red and white oaks, sweetgum, yellow-poplar, and ash, walnut and cherry (about two-fifths of total hardwood growth) and species of more limited demand by industry such as other oaks, hickory, beech, and cottonwood (about three-fifths of total hardwood growth).

Net Growth by Ownership

Around 48 percent of the total net growth of softwoods in 1970, and nearly three-fourths of hardwood net growth, was on lands in farm and miscellaneous private ownerships (Append. I, table 21). Another quarter of the total net growth of softwoods, and 12 percent of hardwood growth, was on forest industry ownerships. The National Forests and other public lands accounted for about 28 percent of all softwood net growth, and 17 percent of hardwood growth.

Net Growth and Potential Growth Per Acre

Average net annual growth in 1970 varied widely by section and by ownership from 23 to 65 cubic feet per acre (table 10). Net growth of the sawtimber portion of total growing stock also varied from an average of 77 board feet per acre in the North to 194 board feet on the Pacific Coast (Append. I, tables 22 and 23).

The relatively large average growth per acre in 1970 in the Pacific Coast section, in spite of the presence of much old-growth timber, largely reflects a high proportion of land in high site productivity classes and high rates of growth in young stands on private lands logged over in the past. In the South the presence of good sites and much thrifty young growth resulting from protection and other forestry practices explain the relatively high growth figures.

Average net growth in the North reflected a high proportion of land in lower productivity classes, predominance of slow-growing hardwood stands, and the presence of considerable rough and rotten timber. Averages for the Rocky Mountains reflected the presence of much old growth, frequent stagnation of stands, relatively low sites, and restocking problems following fire or logging.

In spite of recent substantial increases, net growth of timber is still much less than potential yields in fully stocked natural stands (table 10 and fig. 7). Even higher yields are attainable in stands under intensive management with use of genetically improved trees, fertilization, and spacing control.

The relatively limited net growth of growing stock and sawtimber in 1970 in relation to potentials in part reflected partial stocking of trees on much of the forest area, mortality and growth losses from destructive agents, and the presence of brush and cull trees which limit regeneration and increment of growing stock trees. These and other factors such as restocking problems often make it difficult and costly to achieve "full" stocking.

In old-growth stands in the West, mortality offsets much of the total growth and contributes to the relatively low net annual growth per acre, particularly on western National Forests.

TABLE 10.—*Average net annual and potential growth per acre, by owner, class and section, 1970* [1]

[Cubic feet]

Section	All owners	National Forest	Other public	Forest industry	Farm and miscellaneous private
North:					
Current	31	38	33	40	29
Potential	68	66	59	72	69
South:					
Current	45	55	45	53	42
Potential	76	70	71	81	75
Rocky Mountains:					
Current	24	23	23	47	25
Potential	60	65	54	70	50
Pacific Coast:					
Current	45	27	60	65	58
Potential	95	88	100	107	96
Total:					
Current	38	30	39	52	36
Potential	74	73	68	83	72

[1] Potential growth is defined as the average net growth attainable in fully stocked natural stands. Higher growth rates can be attained in intensively managed stands.

Potential and current net growth per acre

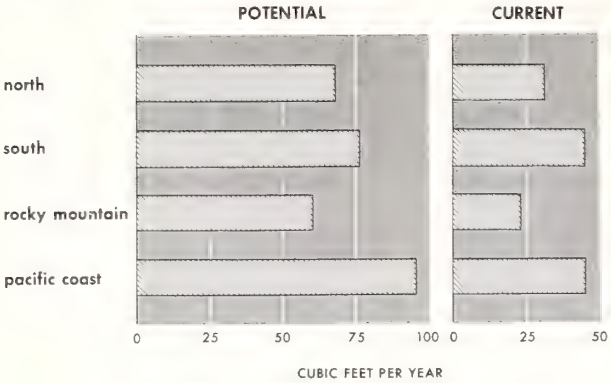

Figure 7

IMPACTS OF DESTRUCTIVE AGENTS

Fire, insects, disease, storms, and other destructive natural agents have significant impacts on net annual growth. Such impacts are partially accounted for by the statistics on mortality (that is, volumes of growing stock trees above 5.0 inches in diameter dying from natural causes during a given period).

Volume of Mortality

Annual mortality losses from natural causes were estimated at about 4.5 billion cubic feet of growing stock in 1970. Mortality of sawtimber amounted to an estimated 15.3 billion board feet (that is, roughly 2.6 billion cubic feet in the saw-log portion of sawtimber trees) (table 11). Mortality thus nullified about one-fifth of the total annual growth of both growing stock and sawtimber.

Softwood species accounted for the major part of mortality losses—that is, about three-fifths of growing stock mortality and three-quarters of sawtimber mortality.

Most softwood mortality in 1970 was in the West, chiefly in the Pacific Coast section (fig. 8). This distribution is related to the concentration of

Timber mortality by section, 1970

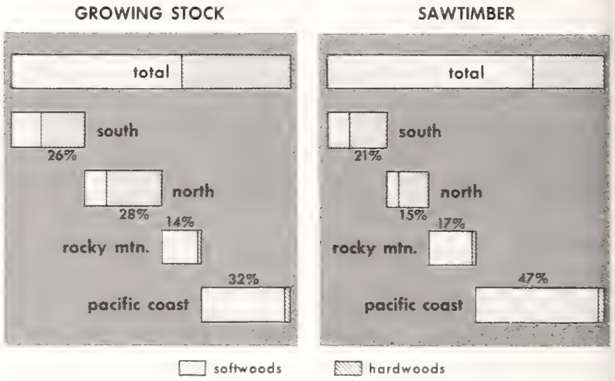

Figure 8

TABLE 11.—*Mortality of growing stock and sawtimber on commercial timberland, by section and by softwoods and hardwoods, 1952, 1962, and 1970* [1]

GROWING STOCK—BILLION CUBIC FEET

Section	All species			Softwoods			Hardwoods		
	1952	1962	1970	1952	1962	1970	1952	1962	1970
North	0.8	1.0	1.3	0.2	0.3	0.4	0.6	0.7	0.9
South	1.0	1.1	1.2	.3	.4	.5	.6	.7	.7
Rocky Mountains	.6	.6	.6	.6	.6	.6	(2)	(2)	(2)
Pacific Coast	1.6	1.5	1.5	1.5	1.4	1.4	.1	.1	.1
Total	3.9	4.3	4.5	2.6	2.7	2.8	1.3	1.5	1.7

SAWTIMBER—BILLION BOARD FEET

Section	All species			Softwoods			Hardwoods		
	1952	1962	1970	1952	1962	1970	1952	1962	1970
North	1.5	1.9	2.3	0.4	0.5	0.7	1.1	1.4	1.7
South	2.6	3.0	3.2	.9	1.1	1.3	1.7	2.0	1.9
Rocky Mountains	2.5	2.6	2.6	2.5	2.5	2.5	.1	.1	.1
Pacific Coast	8.4	7.8	7.1	8.2	7.6	6.9	.2	.2	.3
Total	15.1	15.3	15.3	11.9	11.6	11.3	3.1	3.6	4.0

[1] Data may not add to totals because of truncating.
[2] Less than 0.1 billion.

Note: Data for 1952 and 1962 differ from data published in earlier reports because of adjustments based on newer information from remeasured Forest Survey plots. Data for all years are "trend level" estimates.

timber volumes in the West, and the high proportion of overmature timber in old-growth stands. Much of the sawtimber lost included trees containing large proportions of high-quality material. But most mortality has occurred in inaccessible and unroaded areas, especially on the National Forests, where salvage has not been feasible.

In many important softwood types, bark beetles have been a major cause of mortality, especially in old-growth stands of ponderosa pine, Douglas-fir, and other western species. The mountain pine beetle, for example, has killed billions of board feet of lodgepole and ponderosa pine sawtimber in recent years. Occasional outbreaks of bark beetles in the South, as in 1972, have also caused significant mortality.

Foremost among diseases causing mortality in forest trees are dwarf mistletoes, root rots, white pine blister rust, fusiform rust, hypoxylon canker, oak wilt, and dutch elm disease.

So-called catastrophic losses from fire, insects, or blowdown, included with other forms of mortality in table 11, represent the most spectacular losses, but on the average do not account for a large part of total mortality and growth losses.

Additional Losses From Destructive Agents

Destructive agents also cause additional losses of timber by killing trees under 5 inches in diameter, delaying regeneration by destroying seed crops and seedlings, inhibiting diameter and height growth, reducing quality and usable inventory volumes through decay or other defects, and inducing changes in stand composition from preferred to less desirable species.

The stunting of young trees by insects such as shoot and tip moths, or by diseases such as dwarf mistletoe, for example, frequently extends the time required to grow trees to merchantable size. Various defoliators such as the hemlock looper and spruce budworm often lower forest growth as well as kill trees.

In other cases insects, diseases, or wind cause deformities which limit usable yields of timber, as in the case of white pine weevil in eastern white pine stands. Crooking and forking of hardwoods caused by insects or disease reduce usable tree volumes. Tree borers cause significant degrade and losses of value in some species and areas.

Methods and data are not available to measure these varied impacts of destructive agents, but growth losses have been substantial and an important contributing cause of relatively low current growth rates. Some causes of mortality and growth losses, such as outright destruction of trees by fires, blowdown, or flooding, are highly visible and measurable. But reasons for many losses are not obvious. Insects and diseases also interact in diverse ways with each other and with other agents such as fire and man-related activities.

Salvage of Mortality

An estimated 195 million cubic feet of dead softwood timber and 57 million cubic feet of dead hardwood timber was salvaged in 1970. This was equivalent to about 7 percent of the total estimated mortality of softwoods, and 3 percent of hardwood mortality. Much of the timber salvaged has been in concentrations of timber killed by destructive agents, as in the case of timber blown down in Mississippi by hurricane Camille in 1969, and salvage operations following major fires.

Efforts to reduce mortality include increased thinning operations. Chemicals to control insects and disease have also been widely used, but recent opposition to the use of hard pesticides and delays in control programs related to environmental considerations are having adverse effects on the effectiveness of control. New technology from research programs, and increased forest accessibility through expanding road systems, are helping reduce mortality and increase salvage opportunities.

TIMBER REMOVALS

Timber volumes removed from growing stock inventories on commercial timberland include: (a) harvests of roundwood products such as saw logs, veneer logs, and pulpwood; (b) logging residues; and (c) other removals from changes in land use such as clearing for agriculture or housing developments, and withdrawal of forest lands for parks or other nontimber uses.

Total Timber Removals

Timber removals in 1970 totaled about 14 billion cubic feet of growing stock, including 62.8 billion board feet of sawtimber (table 12). These volumes were substantially above levels in the 1950's and early 1960's when removals averaged about 12 billion cubic feet, including 50 billion board feet of sawtimber.

Softwoods made up some two-thirds of all growing stock removals, and three-quarters of all sawtimber removals, in 1970. These removals were concentrated in the Pacific Coast and South.

About a third of all softwood removals in 1970 came from forest industry ownerships (Append. I, table 21), nearly 40 percent from farm and miscellaneous private ownerships, and about 30 percent from public lands.

Roundwood Timber Harvests

By far the largest portion of timber removals from growing stock consists of roundwood timber products (fig. 9). In 1970, 87 percent of all softwood removals, and 63 percent of all hardwood removals, were used in this way. These products

TABLE 12.—*Timber removals from growing stock and sawtimber, by softwoods and hardwoods and by section, 1952, 1962, and 1970* [1]

GROWING STOCK—BILLION CUBIC FEET

Section	All species			Softwoods			Hardwoods		
	1952	1962	1970	1952	1962	1970	1952	1962	1970
North	2.1	2.1	2.4	0.6	0.6	0.6	1.5	1.5	1.8
South	5.7	5.4	6.5	3.1	2.8	4.0	2.6	2.6	2.5
Rocky Mountains	.5	.7	.9	.5	.7	.9	(2)	(2)	(2)
Pacific Coast	3.5	3.6	4.2	3.5	3.5	4.1	(2)	.1	.1
Total	11.8	11.8	14.0	7.8	7.6	9.6	4.1	4.2	4.4

SAWTIMBER—BILLION BOARD FEET

Section	All species			Softwoods			Hardwoods		
	1952	1962	1970	1952	1962	1970	1952	1962	1970
North	6.7	6.5	9.0	1.9	1.5	2.1	4.8	5.0	6.8
South	20.2	17.2	22.8	11.9	9.8	15.0	8.3	7.3	7.8
Rocky Mountains	3.2	4.3	5.4	3.2	4.3	5.4	(2)	(2)	(2)
Pacific Coast	22.4	22.3	25.6	22.3	22.1	25.2	.1	.2	.4
Total	52.5	50.3	62.8	39.2	37.7	47.7	13.3	12.6	15.0

[1] Data may not add to totals because of truncating.

[2] Less than 0.1 billion.

Note: Data for 1952 and 1962 differ from data published in earlier reports because of adjustments based on newer information from remeasured Forest Survey plots. Data for all years are "trend level" estimates.

amounted to 11.1 billion cubic feet of roundwood, including 54.7 billion board feet of sawtimber (table 13).

In addition to roundwood harvests from growing stock, significant quantities of roundwood—about 1 billion cubic feet in 1970—were produced from rough and rotten trees, dead trees, and other nongrowing stock sources such as trees growing on low site forest lands and in fence rows and shelterbelts.

Total harvests of roundwood timber products from all sources thus amounted to an estimated 1970 "trend level" of output of 12.2 billion cubic feet. Harvests of sawtimber amounted to 54.7 billion board feet, and all sawtimber size material including logs from nongrowing stock sources amounted to an estimated 59 billion board feet (including 46.9 billion board feet of softwoods and 12.3 billion board feet of hardwoods).

Timber removals, 1970

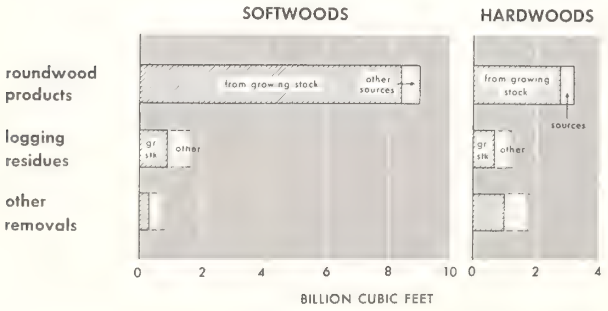

Figure 9

Saw-log harvests.—Saw logs were the most important single product produced from U.S. forests in 1970, with output amounting to 6.2 billion cubic feet (table 13). This harvest represented about 36.2 billion board feet of sawtimber plus about 3.0 billion board feet from other roundwood sources.

Western forests supplied more than half of the total saw logs produced in 1970, and more than one-third of all roundwood products (table 14). Although the West has maintained this relatively high proportion of total output for more than two decades, production on the Pacific Coast has been increasingly supplemented by production in the Rocky Mountain States.

All but 3 percent of the hardwood saw logs harvested in 1970 came from the eastern States, with the cut about equally divided between the North and South. Oaks made up a sizable part of the saw-log harvest in the East. In the South, yellow-poplar and gum were also important components of the timber harvested. In the North, maple, cottonwood, aspen, elm, and birch were the principal species cut. Production of alder for the furniture industry has also become of importance in the Pacific Northwest.

Saw-log production in the United States in 1970 was at about the same level as reported in 1952, but materially higher than in 1962 (fig. 10). Recent increases in saw-log production have come about partly because of rising log exports. More small logs also are being used for a combination of lumber and pulp chips.

Veneer log harvests.—Veneer logs made up about 9 percent of the total roundwood harvested in 1970. Production has risen rapidly in recent decades as a result of rising use of softwood plywood. Harvests of domestic hardwood logs for plywood and veneer, on the other hand, have declined in the face of major increases in imports of hardwood plywood and veneer.

In the early years of softwood plywood manufacture, large high-quality logs were required but by 1970 a high proportion of the production of softwood plywood was in lower quality sheathing grades. Moreover, with new equipment such as high-speed lathes with retractable chucks small logs can now be profitably processed.

During the 1960's a spectacular expansion of the softwood plywood industry occurred in the South, and by 1972 this region supplied roughly 30 percent of the U.S. output of softwood plywood. Hardwood veneer logs also have come primarily from the South.

Pulpwood harvests.—Production of round pulpwood rose from 1.8 billion cubic feet in 1952 to 3.8 billion cubic feet in 1970 (fig. 10). In this latter year an additional 1.8 billion cubic feet of wood used in pulping or exported as pulp chips was obtained as byproducts from lumber and veneer manufacture in such forms as slabs, edgings, and veneer cores (table 13).

The South led the Nation in round pulpwood production in 1970, with more than two-thirds of the total harvest (table 14). The strength and versatility of woodpulp from southern pine, plus historic advantages of low production costs and ready access to eastern and foreign markets have helped increase the South's dominance of the U.S. pulp and paper industry.

Southern pines and other softwoods made up 72 percent of the round pulpwood harvest in 1970. Proportions of hardwoods in pulpwood harvests have risen steadily, however, from 15 percent in 1952 to 28 percent in 1970. Equally significant has been a shift away from almost total dependence on soft-textured hardwood species such as aspen and gum, to the more plentiful oaks and other species such as hard maple, beech, hickory, and paper birch. These hard hardwoods comprised about one-third of the hardwoods cut for pulp in 1970.

Most of the round pulpwood produced has come from poletimber sized trees and upper stems of sawtimber trees. However, a substantial proportion—roughly one-third of the total cubic volume of roundwood used in 1970—or 9.5 billion board feet—came from sawtimber.

Trends in U.S. roundwood harvests 1950 - 72

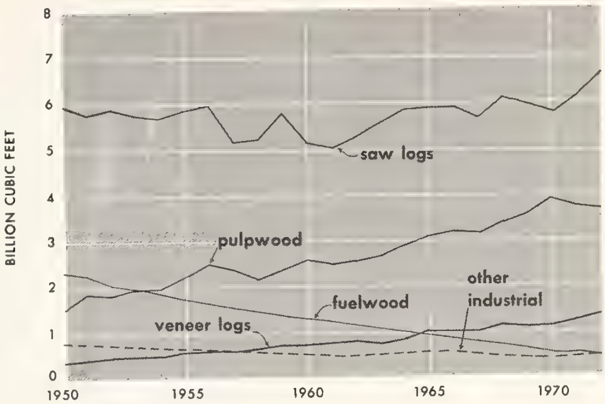

Figure 10

Miscellaneous products harvests.—Production of utility poles, fence posts, mine timbers, piling, cooperage, and other miscellaneous industrial products totaled an estimated 0.4 billion cubic feet of roundwood in 1970. This was somewhat below estimated harvests of these products in 1962, and about 40 percent below output in 1952. The largest drop since 1952 has been in posts, mine timbers, and cooperage logs. An additional 0.2 billion cubic feet of plant byproducts also was used in the manufacture of charcoal and other minor products.

Harvests of round fuelwood in 1970 were estimated at 0.5 billion cubic feet. An additional 0.7 billion cubic feet of plant byproducts—sawdust, slabs, edgings, etc.—also were used for fuel. Nearly all of the round fuelwood was used for domestic heating and cooking, and nearly all of the plant byproducts for heat and power in wood processing plants. Fuelwood harvests have dropped rapidly in recent decades as a result of the substitution of oil, gas, coal, and electricity in home cooking, heating, and industrial uses.

Logging Residues

Residues of trees left behind after logging operations constitute a fairly sizable part of removals of growing stock in 1970—some 10 percent of all softwood removals and 15 percent of all hardwood removals. These residues include material from growing stock trees such as broken sections, upper stems, and logs missed in yarding.

Volumes of logging residues from growing stock in 1970 totaled 1.6 billion cubic feet, or approximately 20 million cords, of solid wood fiber (table 15). About 58 percent of this volume was softwood, and 42 percent hardwood. More than half of the softwood residues were on recent logging operations on the Pacific Coast, and about one-fourth in the South.

In addition to these residues from growing

TABLE 13.—*Output of timber products and timber removals for the United States, by source of material, and by softwoods and hardwoods, 1970*

Products and additional removals	Species group	Standard units	Total output		Plant byproducts output		Output of roundwood products						Output from sawtimber
							All sources roundwood products		Growing stock trees	Rough and rotten trees [1]	Salvable dead trees [1]	Other sources [1]	
			Number of units	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand bd. ft.	31,382,544	4,957,481	429,151	85,228	30,953,393	4,872,253	4,674,040	12,130	97,503	88,580	28,951,191
Do	Hardwoods	do	8,323,817	1,355,458	1,157	260	8,322,660	1,355,198	1,281,711	33,302	16,510	23,675	7,295,250
Total		do	39,706,361	6,312,939	430,308	85,488	39,276,053	6,227,451	5,955,751	45,432	114,013	112,255	36,246,441
Veneer logs and bolts.	Softwoods	do	6,880,942	1,000,587	0	0	6,880,942	1,000,587	912,714	4,840	34,040	48,993	6,190,682
Do	Hardwoods	do	795,962	125,644	0	0	795,962	125,644	121,641	1,948	82	1,973	742,471
Total		do	7,676,904	1,126,231	0	0	7,676,904	1,126,231	1,034,355	6,788	34,122	50,966	6,933,153
Pulpwood	Softwoods	Standard cords.	53,617,281	4,285,407	18,575,046	1,513,458	35,042,235	2,771,949	2,517,962	39,599	23,512	190,876	7,340,318
Do	Hardwoods	do	16,849,918	1,325,740	3,314,643	259,395	13,535,275	1,066,345	927,128	77,276	6,616	55,325	2,192,078
Total		do	70,467,199	5,611,147	21,889,689	1,772,853	48,577,510	3,838,294	3,445,090	116,875	30,128	246,201	9,532,308
Miscellaneous industrial— Cooperage	Softwoods	Thousand bd. ft.	12,793	2,136	0	0	12,793	2,136	2,107				11,192
Do	Hardwoods	do	201,947	28,955	0	0	201,947	28,955	25,185				172,692
Piling	Softwoods	Thousand lin. ft.	27,176	18,910	0	0	27,176	18,910	18,783				102,705
Do	Hardwoods	do	1,574	882	0	0	1,574	882	877				4,133
Poles	Softwoods	Thousand pieces.	5,410	74,204	0	0	5,410	74,204	73,571				361,899
Do	Hardwoods	do	16	213	0	0	16	213	213				949

Mine timbers (round).	Softwoods	Thousand cu. ft.	8,794	8,794	0	0	8,794	8,794	7,386				19,477
Do	Hardwoods	do	23,294	23,294	0	0	23,294	23,294	22,153				59,399
Posts (round and split).	Softwoods	Thousand pieces.	58,071	39,936	104	68	57,967	39,868	34,365				52,700
Do	Hardwoods	do	39,706	28,110	0	0	39,706	28,110	24,121				42,854
Other	Softwoods	Thousand cu. ft.	241,351	241,351	155,907	155,907	85,444	85,444	71,122				422,564
Do	Hardwoods	do	185,333	185,333	72,124	72,124	113,209	113,209	97,163				376,770
Summary, all miscellaneous.	Softwoods			385,331		155,975		229,356	207,334	719	13,556	7,747	970,537
Do	Hardwoods			266,787		72,124		194,663	169,712	9,359	1,444	14,148	656,797
Total				652,122		228,099		424,023	377,050	10,078	15,000	21,895	1,627,334
Fuelwood	Softwood	Standard cords.	8,569,931	706,412	7,197,702	599,331	1,371,229	107,081	54,539	7,633	26,590	18,319	68,323
Do	Hardwoods	do	7,496,178	558,389	1,691,546	127,285	5,804,632	431,104	256,596	41,681	32,228	100,599	340,394
Total, all products	Softwoods			11,335,218		2,353,992		8,981,226	8,366,589	64,921	195,201	354,515	43,521,051
Do	Hardwoods			3,632,018		459,064		3,172,954	2,756,788	163,566	56,880	195,720	11,226,982
Do	All species			14,967,236		2,813,056		12,154,180	11,123,377	228,487	252,081	550,235	54,748,033
Additional removals—													
Logging residues	Softwoods								922,653				2,474,027
Do	Hardwoods								671,595				1,190,093
Total									1,594,248				3,664,120
Other removals	Softwoods								334,103				1,743,691
Do	Hardwoods								981,080				2,614,233
Total									1,315,183				4,357,924
Total removals	Softwoods								9,623,345				47,738,769
Do	Hardwoods								4,409,463				15,031,308
Total									14,032,808				62,770,077

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[1] Output from nongrowing stock sources are not shown for miscellaneous products except in combined form.

TABLE 14.—*Roundwood harvests, by product and section, 1970*

[Million cubic feet]

Species group and product	Total	North	South	Rocky Mountain	Pacific Coast
Softwoods:					
Saw logs	4, 872	198	1, 330	710	2, 634
Veneer logs	1, 001	2	257	73	668
Pulpwood	2, 772	350	1, 992	29	401
Miscellaneous industrial	229	26	107	21	76
Fuelwood	107	3	59	20	25
Total	8, 981	579	3, 745	853	3, 805
Hardwoods:					
Saw logs	1, 355	670	642	1	42
Veneer logs	126	31	93	neg.	2
Pulpwood	1, 066	436	597	neg.	33
Miscellaneous industrial	195	125	69	1	neg.
Fuelwood	431	148	267	8	8
Total	3, 173	1, 410	1, 668	10	85
All species:					
Saw logs	6, 227	868	1, 972	711	2, 676
Veneer logs	1, 127	33	350	73	670
Pulpwood	3, 838	786	2, 589	29	435
Miscellaneous industrial	424	151	176	21	76
Fuelwood	538	151	326	28	33
Total	12, 154	1, 989	5, 413	863	3, 890

Note: Data may not add to totals because of rounding.

stock, substantial volumes of rough and rotten trees, dead trees, limbs, and material under 4 inches in diameter are typically left on the ground after logging. Recent studies in old-growth stands on the Pacific Coast indicated that residues from such nongrowing stock sources above 4 inches in diameter approximately equaled residues from growing stock trees. In hardwood stands of the East, hardwood limbs and rough or rotten trees similarly account for substantial volumes of unutilized wood fiber.

Since 1952, estimated volumes of logging residues from growing stock as a percent of total removals have declined only moderately. Rapid growth of the pulp industry has led to closer utilization of the softwood timber cut, especially in the South. On the other hand, a major decline in use of fuelwood has greatly reduced post-logging use of low-grade material. Also, increased use of mechanized harvesting systems may have tended to raise volumes of logging residues in some areas.

Logging residues in the East especially are widely scattered and occur in relatively small quantities. Many residues are remote from manufacturing plants. Since most logging residues are of a size and form to make cutting into solid wood products uneconomic, potential uses are primarily for pulp and particleboard.

Environmental impacts of logging residues have become an important public issue in some areas, and public concern may supplement economic pressures to reduce residues. Recent action taken on National Forests, for example, to improve timber utilization includes modification of timber sale contracts to provide greater incentives for removal of low-value material.

Other Removals

Other removals largely include timber removed from growing stock inventories by land clearing for nontimber uses, or reservation of forests for parks, wilderness areas, or other purposes. These amounted to an estimated 1.3 billion cubic feet in 1970—or 9 percent of all removals (table 15). These are trend figures designed to show an average situation for recent years.

Some portion of the timber on cleared areas is often utilized and such material is shown as part of roundwood production. However, in most land clearing for home building or agricultural use, for example, timber is typically piled and burned.

Most of the other removals in 1970 consisted of hardwoods, mainly removed in land clearing operations in the South and in other land-use changes in the North. A major part of other removals for softwoods also occurred in the South. In the West most of the loss of timber

TABLE 15.—*Timber removals from growing stock and sawtimber, by source and section, 1970* [1]

GROWING STOCK—BILLION CUBIC FEET

Section	All species			Softwoods			Hardwoods		
	Roundwood products	Logging residue	Other removals	Roundwood products	Logging residue	Other removals	Roundwood products	Logging residue	Other removals
North	1.7	0.3	0.4	0.5	0.1	0.1	1.2	0.2	0.3
South	5.0	.7	.8	3.6	.3	.2	1.4	.4	.6
Rocky Mountains	.8	.1	(2)	.8	.1	(2)	(2)	(2)	(2)
Pacific Coast	3.5	.5	.1	3.5	.5	.1	.1	(2)	(2)
Total United States	11.1	1.6	1.3	8.4	.9	.3	2.8	.7	1.0

SAWTIMBER—BILLION BOARD FEET

Section	All species			Softwoods			Hardwoods		
	Roundwood products	Logging residue	Other removals	Roundwood products	Logging residue	Other removals	Roundwood products	Logging residue	Other removals
North	7.4	0.5	1.1	1.9	0.1	0.2	5.5	0.4	0.9
South	19.3	1.3	2.3	13.9	.6	.6	5.4	.7	1.7
Rocky Mountains	5.0	.3	.1	4.9	.3	.1	(2)	(2)	(2)
Pacific Coast	23.1	1.6	.9	22.8	1.5	.9	.3	(2)	(2)
Total United States	54.7	3.7	4.4	43.5	2.5	1.7	11.2	1.2	2.6

[1] Data may not add to totals because of truncating.

[2] Less than 0.1 billion.

Note: Data for 1952 and 1962 differ from data published in earlier reports because of adjustments based on newer information from remeasured Forest Survey plots. Data for all years are "trend level" estimates.

in other removals was attributable to shifts of forest land to roads, wilderness areas, and other nontimber uses.

NET GROWTH IN RELATION TO REMOVALS

Comparisons of net annual growth and removals provide one measure of the present or prospective timber situation in the United States. In 1970, there were large differences in these relationships, both among species groups and among sections of the country.

Softwood Growth-Removal Balances

In the past two decades net annual growth of softwoods in the eastern sections of the United States has been considerably higher than removals (table 16). Thus in 1970 net growth of eastern softwoods exceeded removals by 2.2 billion cubic feet, or 48 percent. Growth of softwood sawtimber in the East exceeded removals by 6.6 billion board feet, or 39 percent (table 17).

These generally favorable growth-removal balances indicate that eastern forests can support larger softwood timber harvests. However, large areas are still understocked and a growth surplus will be needed for some time if inventories are to be built up to more desirable levels. Also, some part of the growth is on land held primarily for recreation or other nontimber purposes, and thus may not be available for industrial use.

In the West, net growth of softwood growing stock in 1970 was about 1.1 billion cubic feet, or 22 percent, less than removals (fig. 11). Net growth of softwood sawtimber was some 14 billion board feet, or 46 percent, less than removals.

These apparent imbalances in the West do not in themselves represent a serious problem, for a sizable part of the western timber harvest is drawn from old-growth stands where allowable harvests can exceed net growth for some time to come. The trend in net growth in the West is rising, but with 1970 levels of management prospective increases in net growth would not be sufficient to sustain 1970 levels of timber harvest indefinitely.

Hardwood Growth-Removal Balances

Net growth of eastern hardwoods in 1970 substantially exceeded removals, particularly in the North (tables 16 and 17). For the entire East, net growth of hardwoods was 3.1 billion cubic feet, or 72 percent, greater than removals.

For hardwood sawtimber, net growths was 3.4 billion board feet, or 23 percent, greater than removals. Although growth-removal balances for hardwoods were generally favorable, in areas where extensive clearing of bottomlands has occurred, as in the West Gulf region of the South, net growth of hardwoods in 1970 was less than removals (Append. I, tables 25 and 26).

TABLE 16.—*Net annual growth and removals of growing stock, by species group and section* [1]

[Billion cubic feet]

Section	All species			Softwoods			Hardwoods		
	1952	1962	1970	1952	1962	1970	1952	1962	1970
North:									
Net growth	4.1	4.9	5.5	1.1	1.2	1.4	3.0	3.6	4.2
Removals	2.1	2.1	2.4	.6	.6	.6	1.5	1.5	1.8
Ratio of growth to removals	2.0	2.4	2.3	1.7	2.2	2.2	2.1	2.4	2.3
South:									
Net growth	6.3	7.5	8.6	3.6	4.5	5.4	2.7	3.0	3.2
Removals	5.7	5.4	6.5	3.1	2.8	4.0	2.6	2.6	2.5
Ratio of growth to removals	1.1	1.4	1.3	1.2	1.6	1.4	1.1	1.1	1.3
Rocky Mountains:									
Net growth	1.2	1.3	1.4	1.1	1.2	1.3	.1	.1	.1
Removals	.5	.7	.9	.5	.7	.9	(2)	(2)	(2)
Ratio of growth to removals	2.2	1.8	1.5	2.1	1.7	1.4	21.9	18.9	26.2
Pacific Coast:									
Net growth	2.3	2.7	3.1	2.0	2.3	2.6	.3	.4	.5
Removals	3.5	3.6	4.2	3.5	3.5	4.1	(2)	.1	.1
Ratio of growth to removals	.7	.8	.7	.6	.7	.6	6.7	4.9	4.1
Total, United States:									
Net growth	13.9	16.4	18.6	7.8	9.3	10.7	6.1	7.1	7.9
Removals	11.8	11.8	14.0	7.8	7.6	9.6	4.1	4.2	4.4
Ratio of growth to removals	1.2	1.4	1.3	1.0	1.2	1.1	1.5	1.7	1.8

[1] Data may not add to totals because of rounding.
[2] Less than 0.1 billion.

Note: Data for 1952 and 1962 differ from data published in earlier reports because of adjustments based on newer information from remeasured Forest Survey plots. Data for all years are "trend level" estimates.

TABLE 17.—*Net annual growth and removals of sawtimber, by species group and section* [1]

[Billion board feet]

Section	All species			Softwoods			Hardwoods		
	1952	1962	1970	1952	1962	1970	1952	1962	1970
North:									
Net growth	9.4	11.5	13.7	2.4	2.8	3.6	7.0	8.6	10.1
Removals	6.7	6.5	9.0	1.9	1.5	2.1	4.8	5.0	6.8
Ratios of growth to removals	1.4	1.8	1.5	1.3	1.9	1.7	1.4	1.7	1.5
South:									
Net growth	21.2	24.3	28.0	13.6	16.7	20.1	7.6	7.6	7.9
Removals	20.2	17.2	22.8	11.9	9.8	15.0	8.3	7.3	7.8
Ratio of growth to removals	1.1	1.4	1.2	1.1	1.7	1.3	.9	1.0	1.0
Rocky Mountains:									
Net growth	4.3	4.6	5.1	4.2	4.5	4.9	.1	.1	.1
Removals	3.2	4.3	5.4	3.2	4.3	5.4	(2)	(2)	(2)
Ratio of growth to removals	1.3	1.1	.9	1.3	1.1	.9	6.3	5.4	11.7
Pacific Coast:									
Net growth	10.3	11.9	13.1	9.4	10.7	11.6	.9	1.2	1.5
Removals	22.4	22.3	25.6	22.3	22.1	25.2	.1	.2	.4
Ratio of growth to removals	.5	.5	.5	.4	.5	.5	6.2	5.0	4.0
Total, United States:									
Net growth	45.1	52.3	59.9	29.5	34.7	40.3	15.6	17.6	19.7
Removals	52.5	50.3	62.8	39.2	37.7	47.7	13.3	12.6	15.0
Ratio of growth to removals	.9	1.0	1.0	.8	.9	.8	1.2	1.4	1.3

[1] Data may not add to totals because of rounding.
[2] Less than 0.1 billion.

Note: Data for 1952 and 1962 differ from data published in earlier reports because of adjustments based on newer information from remeasured Forest Survey plots. Data for all years are "trend level" estimates.

Timber growth and removals, 1970

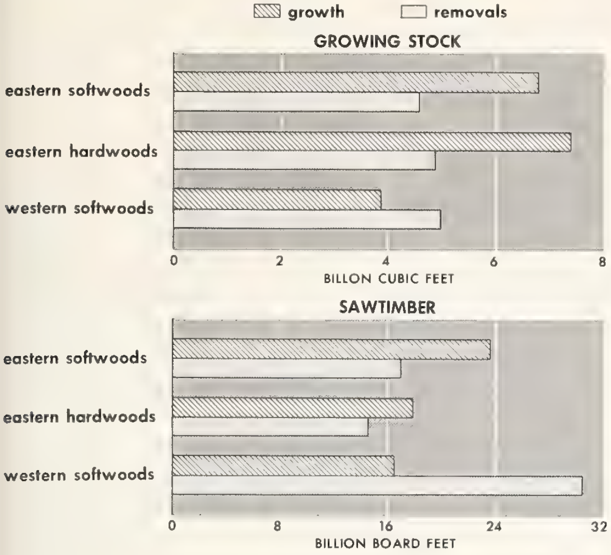

Figure 11

Utilization of hardwoods is highly oriented to preferred species such as walnut, sweetgum, and yellow birch (Append. I, table 24). Relatively heavy cutting of large diameter trees has also led to a decline in quality of hardwood inventories, and a buildup of smaller diameter trees and nonpreferred species of hardwoods.

On the Pacific Coast hardwoods such as alder have occupied many areas following cutting of the softwood stands, and hardwood growth has been far above removals.

Net annual growth per acre in 1970 ranged from about 3 times removals on National Forests in the East to 1.2 times on eastern farm and miscellaneous private ownerships (fig. 12). In the West, on the other hand, removals per acre ranged from 3 times growth on forest industry lands to a small excess of growth on farm and miscellaneous private holdings.

Timber removals per acre were relatively high on forest industry lands, as a result of high sites, heavy stands of timber, and relatively high levels of forestry investments. Nationwide, removals of sawtimber on industry lands averaged about 5 percent of the inventory of standing timber, compared with somewhat more than 1 percent on public ownerships.

TIMBER INVENTORIES

During the next few decades most timber harvests must come from trees now standing on commercial timberlands. The volume, species composition, location, quality, and ownership of this standing timber is thus of major importance in appraising the present and prospective timber situation.

Sawtimber growth and removals per acre, by ownerships, 1970

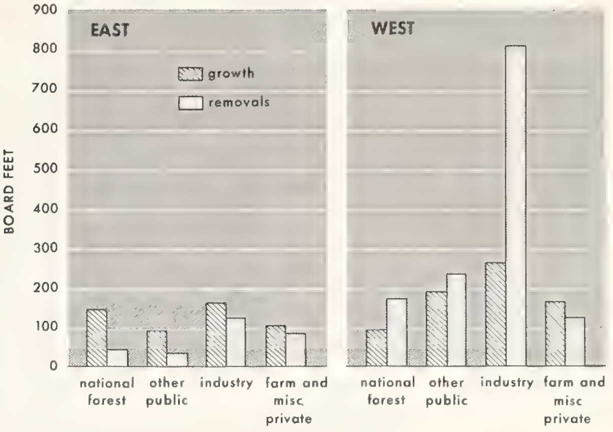

Figure 12

Total Timber Volumes

Commercial timberlands of the United States supported some 715 billion cubic feet of sound wood in 1970 (table 18 and Append. I, table 10). About 64 percent of this total volume was in sawtimber trees (trees large enough to contain at least one log suitable for the manufacture of lumber) (fig. 13). Another 27 percent was in poletimber trees (trees from 5 inches in diameter at breast height to sawtimber size and now or prospectively suitable for industrial roundwood). The remaining 9 percent of all sound wood volumes was in rough and rotten trees and salvable dead trees. Some of this latter material is suitable for lumber and veneer but most of it is usable only for pulp and other products where log quality requirements are more flexible.

Softwood Inventories

Softwoods predominate in the Nation's timber inventory, accounting for about 64 percent of the total volume of all classes of timber, and 75 percent of the total sawtimber volume. These inventories of softwoods are mostly on the Pacific Coast (table 19). This distribution, in contrast to that for commercial timberland, which is mostly in the East, reflects the concentration of timber in western old-growth stands with relatively high volumes per acre.

About 27 percent of the Nation's softwood sawtimber inventory in 1970 was Douglas-fir—the Nation's most important softwood species (table 20). Three-fifths of this Douglas-fir inventory was located in western Washington and western Oregon. Western hemlock, true firs, ponderosa

TABLE 18.—*Timber inventories on commercial timberlands, by class of material and species group, 1970*

Class of timber	All species		Softwoods			Hardwoods
	Volume	Proportion	Total	Eastern	Western	
	Million cu. ft.	*Percent*	*Million cu. ft.*	*Million cu. ft.*	*Million cu. ft.*	*Million cu. ft.*
Sawtimber trees:						
Saw-log portions	[1] 410, 774	57. 5	317, 280	66, 219	251, 062	93, 493
Upper stems	44, 602	6. 2	23, 753	10, 039	13, 714	20, 849
Total	455, 376	63. 7	341, 033	76, 258	264, 776	114, 342
Poletimber trees	193, 504	27. 1	90, 840	41, 261	49, 579	102, 664
Total growing stock	648, 879	90. 8	431, 874	117, 519	314, 355	217, 005
Salvable dead trees	12, 035	1. 7	11, 361	173	11, 189	673
Sound cull trees	33, 921	4. 7	6, 910	3, 773	3, 138	27, 010
Rotten cull trees	19, 711	2. 8	5, 022	1, 281	3, 742	14, 689
All classes	[2] 714, 546	100. 0	455, 168	122, 746	332, 423	259, 378

[1] This portion is also expressed in board feet of sawtimber, i.e., 2,420,767 million board feet, or an average of 5.9 board feet per cubic foot of the saw-log portion.

[2] Additional timber volumes not inventoried by the Forest Survey, but providing some timber products, include wood in limbs and stumps, trees on noncommercial forest lands, and trees on other areas such as parks and fence rows.

Note: Data may not add to totals because of rounding.

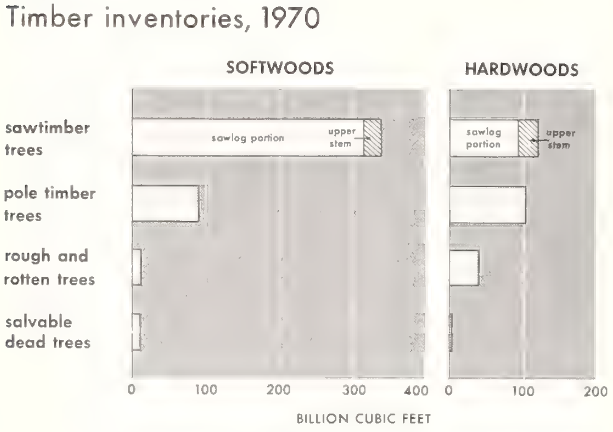

Figure 13

pine, and other western softwoods comprised another 54 percent of U.S. softwood inventories.

These western softwoods provided about three-quarters of the timber used in the manufacture of softwood plywood in 1970, and two-thirds of the logs used for softwood lumber. This was of course related to the concentration of softwood inventories in the West and the predominance of relatively large-size high-quality trees (table 21). As old-growth stands are harvested, the geographical distribution of timber inventories and available harvests will of necessity conform more and more closely to areas of commercial timberlands.

Eastern softwoods, including mainly southern pines, made up 18 percent of the Nation's growing stock in 1970, and about 15 percent of softwood sawtimber volumes.

Most southern pine timber in 1970 was relatively small, with four-fifths of the total inventory in trees less than 15 inches in diameter. Nonetheless, the South was the source of about a quarter of the softwood lumber and plywood, and three-fourths of the softwood pulpwood produced in 1970. Inventories of fir, white and red pine, hemlock, cypress, and other eastern softwoods also were concentrated in the smaller sizes.

Hardwood Inventories

Hardwoods made up about 36 percent of all classes of standing timber in 1970, and about 25 percent of all sawtimber (table 18). More than half of all hardwood growing stock was in the North (table 19).

More than a third of hardwood sawtimber volumes in 1970 was in select species—that is, select white and red oaks,[3] hard maple, yellow birch, sweetgum, yellow-poplar, ash, black walnut, and black cherry (table 20). These are the species preferred for cabinet work, paneling, furniture, and other uses where quality and/or surface appearance are important considerations.

Nearly two-thirds of the hardwood sawtimber inventory in 1970 was composed of upland oaks, hickory, beech, cottonwood, and various other species that have more limited potentials for high-quality hardwood products. However, most of this timber is suitable for the manufacture of products

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[3] Select white oaks include *Quercus alba, Q. michauxii, Q. muehlenbergii, Q. durandii, Q. bicolor,* and *Q. macrocarpa.* Select red oaks include *Q. rubra, Q. falcata* var. *pagodaefolia,* and *Q. shumardii.*

Table 19.—*Growing stock and sawtimber inventories on commercial timberlands, by section and softwoods and hardwoods, 1970*

GROWING STOCK

Section	All species		Softwoods		Hardwoods	
	Volume	Proportion	Volume	Proportion	Volume	Proportion
	Billion cu. ft.	*Percent*	*Billion cu. ft.*	*Percent*	*Billion cu. ft.*	*Percent*
North	155.7	24.0	39.1	9.0	116.6	53.7
South	159.5	24.6	78.4	18.2	81.1	37.4
Rocky Mountains	92.2	14.2	87.7	20.3	4.5	2.1
Pacific Coast	241.5	37.2	226.6	52.5	14.8	6.8
Total	648.9	100.0	431.9	100.0	217.0	100.0

SAWTIMBER

Section	All species		Softwoods		Hardwoods	
	Volume	Proportion	Volume	Proportion	Volume	Proportion
	Billion bd. ft.	*Percent*	*Billion bd. ft.*	*Percent*	*Billion bd. ft.*	*Percent*
North	331.9	13.7	80.1	4.2	251.8	48.8
South	483.9	20.0	275.9	14.5	208.0	40.4
Rocky Mountains	364.4	15.1	355.1	18.6	9.3	1.8
Pacific Coast	1,240.6	51.2	1,194.2	62.7	46.4	9.0
Total	2,420.8	100.0	1,905.3	100.0	515.5	100.0

Note: Data may not add to totals because of rounding.

such as railroad ties, pallet lumber, and construction timber.

Only 12 percent of the hardwood growing stock volume in 1970 was in trees 19 inches and larger in diameter at breast height (table 21). This limited supply of larger timber further limits suitability of hardwood timber for products where quality is important.

About 40 percent of the total hardwood inventory was between 11 and 19 inches in diameter—trees large enough for the manufacture of common grades of lumber and products such as ties and timbers. Trees 5 to 11 inches in diameter made up about half of the total hardwood inventory.

Ownership of Timber Inventories

The largest portion of the softwood timber inventory in 1970 was in National Forests, including some 46 percent of all softwood growing stock and 51 percent of all softwood sawtimber (table 22). Most of these timber volumes were in old-growth stands in the West, with a major part in areas still lacking access roads. Only 8 percent of all hardwood growing stock was in National Forests.

Farm and miscellaneous private ownerships contained the major part of the Nation's inventory of hardwoods—about 71 percent—and a substantial part of all softwood inventories—about 26 percent. Nearly all of this timber is readily accessible from existing road systems and is relatively close to timber markets.

Forest industries in 1970 held about 17 percent of all softwood inventories, and a somewhat smaller proportion of hardwoods. Wood-using plants in the East thus must look to nonindustrial private ownerships for much of their timber supply, while many western firms must depend on National Forest and other public lands for much of their log requirements.

Public ownerships other than National Forests held roughly 10 percent of all timber inventories in 1970. These inventories were of particular importance in the Pacific Northwest and the Lake States.

Trends in Timber Inventories

Total inventories of softwoods in the United States increased about 1 percent between 1962 and 1970, while softwood sawtimber volumes dropped about 3 percent (table 23). Hardwood volumes increased by somewhat larger percentages for both sawtimber and total growing stock. These trends in inventories in part reflect significant success in efforts to protect and improve American forests.

Inventories rose substantially in the South and in the North for both softwood and hardwood volumes. Inventories decreased in the Pacific Coast and Rocky Mountain sections, as would be expected while old-growth stands are being harvested.

Inventories increased between 1952 and 1970 in all size classes except in the 30-inch and larger

TABLE 20.—*Growing stock and sawtimber inventories on commercial timberlands, by species, 1970*

Species	Growing stock		Sawtimber	
	Volume	Proportion	Volume	Proportion
Eastern softwoods:	*Million cu. ft.*	*Percent*	*Million bd. ft.*	*Percent*
Southern pines	74,622	11.5	259,059	10.7
Spruce and fir	17,322	2.6	23,486	1.0
White and red pines	8,348	1.3	26,874	1.1
Cypress	5,034	.8	19,111	.8
Other [1]	12,193	1.9	27,407	1.1
Total	117,519	18.1	355,937	14.7
Eastern hardwoods:				
Select white and red oaks	32,613	5.0	85,835	3.5
Other oaks	38,796	6.0	99,069	4.1
Hickory	12,582	2.0	30,915	1.3
Hard maple	11,732	1.8	25,758	1.1
Ash, walnut, and black cherry	12,185	1.9	25,405	1.1
Sweetgum	10,527	1.6	26,318	1.1
Yellow-poplar	8,566	1.3	25,094	1.0
Yellow birch	3,249	.5	7,323	.3
Other	67,426	10.4	134,065	5.5
Total	197,676	30.5	459,781	19.0
Total eastern	315,194	48.6	815,718	33.7
Western softwoods:				
Douglas-fir	96,861	14.9	520,640	21.5
Western hemlock	47,540	7.3	251,012	10.4
True firs	45,326	7.0	218,772	9.0
Ponderosa and Jeffrey pines	38,292	5.9	189,897	7.8
Spruce	26,296	4.0	132,225	5.5
Lodgepole pine	25,530	3.9	65,273	2.7
White and sugar pines	8,337	1.3	44,392	1.8
Redwood	4,428	.7	23,627	1.0
Other	21,745	3.4	103,515	4.3
Total	314,355	48.4	1,549,352	64.0
Western hardwoods	19,330	3.0	55,696	2.3
Total western	333,685	51.4	1,605,048	66.3
All species	648,879	100.0	2,420,767	100.0

[1] Includes 128 million cubic feet and 540 million board feet of ponderosa pine in eastern South Dakota and Nebraska.

classes of softwoods (fig. 14). Increases in stand volumes were especially large in the 5- to 11-inch diameters.

PLANT RESIDUES

Wood residues from primary processing at sawmills and other wood processing plants provide an important part of the fiber supply for the pulp industry and a significant potential for further expansion of wood-based industries.

Trends in Utilization of Plant Byproducts

In recent years the wood-using industries have made much progress in utilization of the roundwood delivered to sawmills, veneer mills, and other primary wood processing plants. In 1970, an estimated 2.8 billion cubic feet of slabs, sawdust, veneer cores, and other similar material resulting from the manufacture of lumber and other wood products was used for pulp, particleboard, fuel, or other products (table 24). This represented about 74 percent of all such material produced.

Use of these plant byproducts by the pulp industry was of chief importance, almost 1.8 billion cubic feet (about 22 million cords) being used for pulp in 1970, including nearly 2 million cords of chip exports to Japan. Use of such material for pulping increased nearly 18-fold between 1952 and 1970 (fig. 15).

Volumes of plant byproducts used for other products such as particleboard, although small, also have increased substantially. Use of sawdust, slabs, etc. for industrial and domestic fuel, on the other hand, has declined sharply.

TABLE 21.—*Growing stock inventories, by species and diameter classes, 1970*

[Million cubic feet]

Species	All diameters	5.0 to 9.0 inches	9.0 to 11.0 inches	11.0 to 15.0 inches	15.0 to 19.0 inches	19.0 to 29.0 inches	29.0 inches and larger
Eastern softwoods:							
Southern pines	74, 622	20, 988	13, 790	23, 154	11, 549	5, 006	136
Spruce and fir	17, 322	11, 199	2, 962	2, 370	637	154	----------
White and red pines	8, 348	2, 394	1, 152	2, 192	1, 364	1, 133	114
Cypress	5, 034	1, 040	718	1, 545	914	655	162
Other	12, 193	5, 640	2, 119	2, 582	1, 180	625	46
Total	117, 519	41, 261	20, 741	31, 843	15, 644	7, 573	458
Eastern hardwoods:							
Select white and red oaks	32, 613	8, 358	5, 148	9, 232	5, 490	3, 888	498
Other oaks	38, 796	10, 364	6, 149	10, 525	6, 474	4, 644	639
Hickory	12, 582	3, 699	2, 143	3, 548	1, 914	1, 176	103
Hard maple	11, 732	4, 148	1, 907	2, 840	1, 667	1, 106	64
Ash, walnut, and black cherry	12, 185	4, 033	2, 201	3, 353	1, 683	861	54
Yellow-poplar	8, 566	1, 692	1, 250	2, 685	1, 791	1, 053	94
Yellow birch	3, 249	1, 038	538	835	476	332	30
Other	77, 953	27, 944	13, 737	19, 250	10, 091	6, 301	629
Total	197, 676	61, 276	33, 073	52, 267	29, 587	19, 362	2, 111
Western softwoods:							
Douglas-fir	96, 861	8, 160	5, 544	12, 406	12, 176	22, 985	35, 589
Western hemlock	47, 540	2, 788	2, 396	5, 765	6, 690	15, 447	14, 454
True firs	45, 326	5, 865	3, 536	6, 999	6, 342	11, 437	11, 147
Ponderosa and Jeffrey pines	38, 292	3, 304	2, 252	5, 340	5, 827	11, 823	9, 746
Spruce	26, 296	2, 422	1, 656	3, 964	4, 114	6, 933	7, 206
White and sugar pines	8, 337	526	416	1, 042	1, 052	2, 242	3, 058
Redwood	4, 428	96	109	315	417	1, 079	2, 412
Other	47, 275	14, 695	6, 805	9, 043	4, 841	6, 242	5, 649
Total	314, 355	37, 858	22, 715	44, 874	41, 460	78, 187	89, 261
Western hardwoods	19, 330	5, 559	2, 755	4, 562	2, 840	2, 829	783
All species	648, 879	145, 955	79, 284	133, 546	89, 531	107, 951	92, 613

Note: Data may not add to totals because of rounding.

Closer utilization of the roundwood delivered to sawmills and other plants has been made possible by a number of technological and economic developments. Widespread installation of log debarkers and chippers at sawmills has permitted production of bark-free chips of high quality and relatively low cost compared with roundwood. Recent installation of chipping headrigs in sawmills has also helped increase chip output. New technology in pulping with continuous digesters has provided added opportunities for use of sawdust and other fine residues. Enactment of State laws controlling disposal of waste material by burning or dumping also has stimulated the search for uses of waste materials.

Primary Plant Residues

In spite of the rapid growth in use of the byproducts of primary manufacture of wood products, volumes of unused residues were still sizable in 1970. Almost one billion cubic feet (more than 12 million cords) of material was left unused at sawmills and other primary manufacturing plants (table 24).

About two-thirds of this unused material was softwoods (fig. 16). About 40 percent of this softwood volume (3.4 million cords) was chippable residues, that is, slabs, edgings, and other coarse material. Most of this volume was on the Pacific Coast, although there were also substantial volumes in the South and Rocky Mountains (Append. I, table 43). Coarse hardwood residues in the East totaled about 132 million cubic feet (1.7 million cords).

Unused sawdust and other fine residues amounted to 7.4 million cords in 1970. Unused plant residues in 1970 were largely at some distance from markets or in areas where supply currently exceeded demand. Use of residues is increasing rapidly, however, and it seems likely that within the next decade or so most of the coarse softwood

TABLE 22.—*Ownership of growing stock and sawtimber, by softwoods and hardwoods, January 1, 1970*

GROWING STOCK

Type of ownership	Total		Softwoods		Hardwoods	
	Volume	Proportion	Volume	Proportion	Volume	Proportion
	Billion cu. ft.	*Percent*	*Billion cu. ft.*	*Percent*	*Billion cu. ft.*	*Percent*
National Forest	217	34	200	46	18	8
Other public	68	10	48	11	20	9
Forest industry	100	15	73	17	27	12
Farm and miscellaneous private	264	41	110	26	153	71
All ownerships	649	100	432	100	217	100

SAWTIMBER

Type of ownership	Total		Softwoods		Hardwoods	
	Volume	Proportion	Volume	Proportion	Volume	Proportion
	Billion bd. ft.	*Percent*	*Billion bd. ft.*	*Percent*	*Billion bd. ft.*	*Percent*
National Forest	1, 022	42	982	51	40	8
Other public	263	11	223	12	40	8
Forest industry	386	16	318	17	68	13
Farm and miscellaneous private	751	31	382	20	368	71
All ownerships	2, 421	100	1, 905	100	515	100

Note: Data may not add to totals because of rounding.

TABLE 23.—*Growing stock and sawtimber inventories on commercial timberland, by section and by softwoods and hardwoods, 1952, 1962, and 1970* [1]

GROWING STOCK—BILLION CUBIC FEET

Section	All species			Softwoods			Hardwoods		
	1952	1962	1970	1952	1962	1970	1952	1962	1970
North	110. 0	135. 2	155. 7	27. 8	34. 0	39. 1	82. 2	101. 2	116. 6
South	130. 7	145. 0	159. 5	55. 1	66. 8	78. 4	75. 6	78. 3	81. 1
Rocky Mountains	89. 0	95. 8	92. 2	85. 0	91. 3	87. 7	4. 0	4. 5	4. 5
Pacific Coast	253. 5	247. 9	241. 5	243. 1	235. 2	226. 6	10. 4	12. 7	14. 8
United States	583. 1	623. 9	648. 9	411. 0	427. 2	431. 9	172. 1	196. 7	217. 0

SAWTIMBER—BILLION BOARD FEET

Section	All species			Softwoods			Hardwoods		
	1952	1962	1970	1952	1962	1970	1952	1962	1970
North	246. 3	290. 7	331. 9	58. 9	69. 2	80. 1	187. 4	221. 5	251. 8
South	391. 1	434. 9	483. 8	185. 6	230. 4	275. 9	205. 5	204. 5	208. 0
Rocky Mountains	378. 1	390. 9	364. 4	369. 2	381. 3	355. 1	8. 9	9. 6	9. 3
Pacific Coast	1, 396. 5	1, 313. 8	1, 240. 6	1, 365. 2	1, 274. 6	1, 194. 2	31. 3	39. 2	46. 4
United States	2, 412. 0	2, 430. 3	2, 420. 8	1, 978. 9	1, 955. 5	1, 905. 3	433. 1	474. 8	515. 5

[1] Data may not add to totals because of truncating.

Note: Data for 1952 and 1962 differ from data published in earlier reports because of adjustments based on newer information from remeasured Forest Survey plots. Data for all years are "trend level" estimates.

Timber inventory, by diameter class, 1952 and 1970

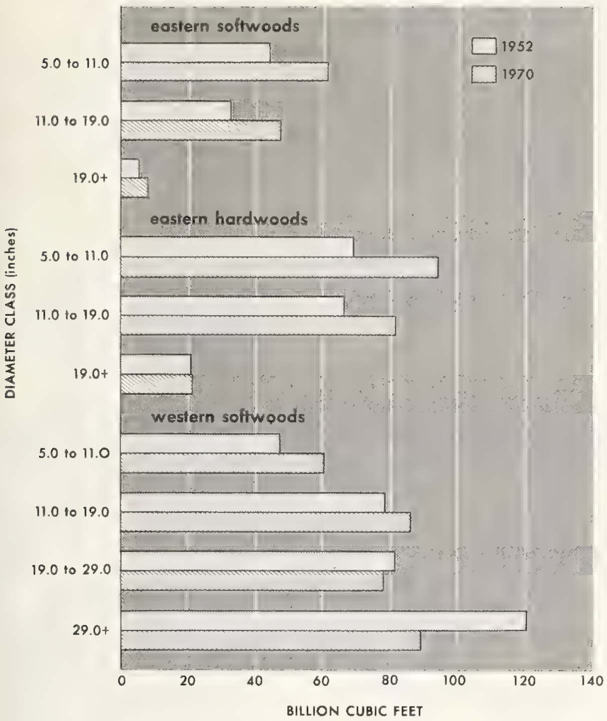

Figure 14

residues, and a substantial part of the fine residues, will be utilized for pulp and particleboard.

Secondary Plant Residues

In addition to unused residues at sawmills and other primary wood processing plants,

Disposal of plant residues, 1952-1970

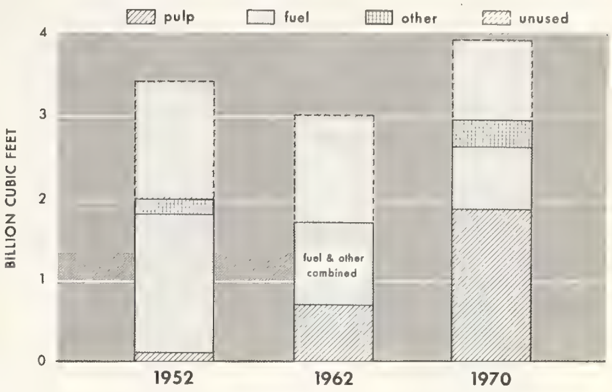

Figure 15

Wood residues at primary plants, 1970

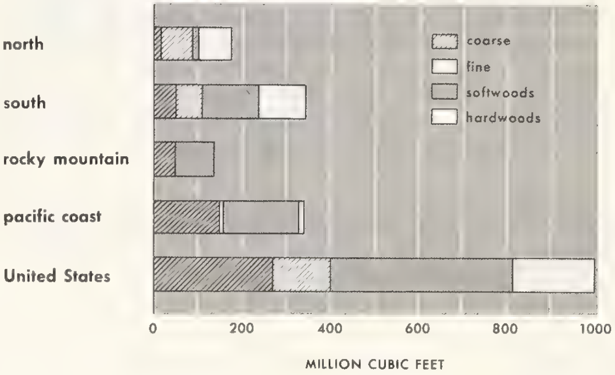

Figure 16

TABLE 24.—*Residues at primary wood processing plants in the United States, by species group and use, 1970*

[Million cubic feet]

Item	All species		Softwoods		Hardwoods	
	Volume	Percent	Volume	Percent	Volume	Percent
Used for pulp	1, 773	46. 6	1, 514	49. 9	259	33. 7
Used for fuel	726	19. 1	599	19. 7	127	16. 5
Used for other products	313	8. 2	241	7. 9	72	9. 4
All uses	2, 813	73. 9	2, 354	77. 5	459	59. 6
Unused:						
Coarse	402	10. 6	270	8. 9	132	17. 2
Fine	591	15. 5	412	13. 6	179	23. 2
Total unused	993	26. 1	682	22. 5	311	40. 4
Total residues	3, 806	100. 0	3, 036	100. 0	770	100. 0

Source: Forest Survey surveys of wood processing plants.

sizable quantities of shavings, trimmings, and other residues are generated at secondary wood manufacturing establishments producing millwork, hardwood dimension and flooring, prefabricated structures, pallets, and a wide variety of other products. These secondary plants are mainly small and widely distributed, with many in eastern population centers.

Although statistics on amounts of byproducts generated and used at secondary manufacturing plants are not generally available, a study of establishments in the Midwest [4] disclosed a total production of close to 241 million cubic feet of material which was disposed of as follows:

Disposal	*Percent*
Fiber products	12
Industrial fuel	28
Domestic fuel	2
Miscellaneous	24
Burned or dumped as waste	34
Total	100

This limited sample suggests that total production of secondary plant byproducts in the United States in 1970 may have approximated 900 million cubic feet. Possibly 100 million cubic feet of this material was used for particleboard, or other products. These uses are expected to increase somewhat, although opportunities for expansion are apparently less promising than for primary plant residues in view of the character and scattered location of secondary residues.

Bark Residues

Volumes of bark accumulated at sawmills and other primary processing plants, based upon limited studies and informed judgment, amounted to roughly 2 billion cubic feet in 1970. Most of this sizable volume of material represented a waste disposal problem, as indicated by the following estimates:

Disposal	*Percent*
Used for industrial fuel including charcoal	23
Used for domestic fuel or given away	4
Used for fiber products	1
Used for miscellaneous purposes	3
Burned or dumped	69
Total	100

Environmental considerations have added urgency to the search for economic uses for the large amounts of unused bark. Some progress has been made in developing markets for bark as soil amendments, mulches, livestock bedding, and charcoal.[5] Rising costs for fossil fuels may also increase the attractiveness of bark, as well as other wood residues, as a source of energy. Some quantities of bark may also be incorporated in certain types of particleboard and other fiberboards.

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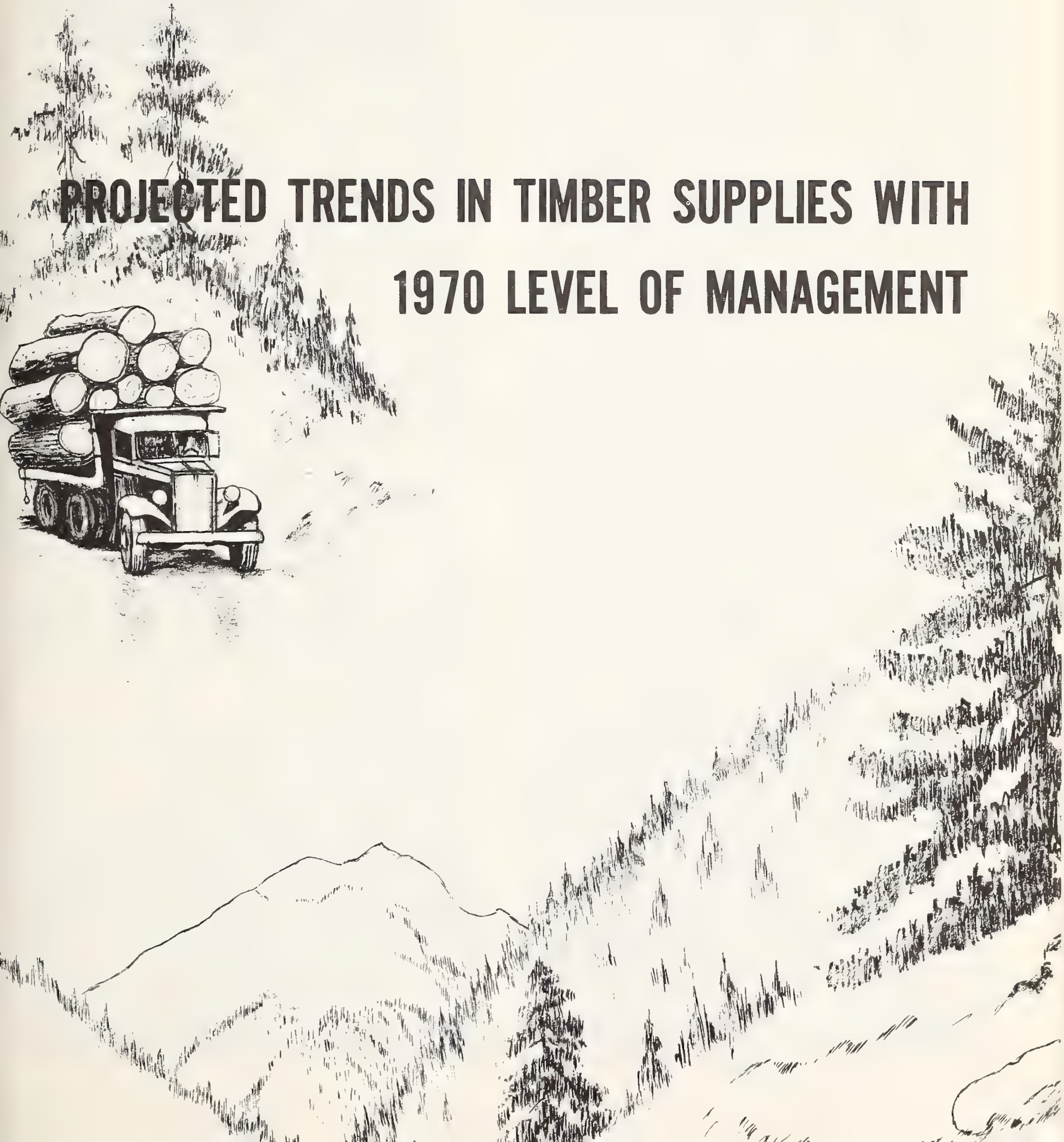
[4] Carpenter, Eugene M. Wood residues—a cost or a market potential? Woodworking and Furniture Digest 73(1), 3 p. June 1971.

[5] Mater, Jean. How to turn bark into dollars. Wood and Wood Products 74(1):31–32, 38. 1969.

CHAPTER II

PROJECTED TRENDS IN TIMBER SUPPLIES WITH 1970 LEVEL OF MANAGEMENT



This chapter presents estimates of potential supplies of timber products from U.S. forests during the next half century under the assumption that forest management efforts will continue at approximately 1970 levels.

An initial set of basic projections of timber supply was first developed based on the further assumptions (1) that timber harvesting would be related to prospectively available growth of timber, or in the case of public lands to allowable harvests, and (2) that areas of commercial timberland will decline somewhat as a result of increasing use of forest lands for nontimber purposes.

A second set of projections is also included to indicate supplies of softwood sawtimber considered likely to be available for harvesting with different price levels. These economic supply projections were based in part upon the base projections of softwood sawtimber supplies that might be physically available and judgments as to timber operability, utilization potentials, and owners' willingness to sell timber at various price levels. It is recognized that higher prices for timber products should also lead to increased investments in timber growing but it is estimated that this would have only limited effects on available roundwood supplies during the projection period used in this study.

The projections of timber supplies in this and the following chapter should be regarded as conditional statements of roundwood supplies likely to be available in the future if the specified assumptions as to level of management, timber harvesting practices, area of available timberland, and other factors are actually realized. It is of course apparent that many alternative projections could be made depending on assumptions as to to these key variables.

Also, as in the case of demand projections, cyclical variations in availability of timber supplies could be significant, and differences between projections and actual supplies in the future could become progressively greater as the projection period lengthens. Factors such as environmental limitations, and impacts of nontimber uses on timber supplies, have been considered in this analysis but unforeseen changes in these factors could also have additional impacts on availability of timber for industrial use.

In the last chapter of this report the timber supply projections developed in this and the following chapter are compared with the projections of timber demands developed in Chapter V. This comparison is designed to provide an indication of prospective relationships between timber supplies and demands, related price implications, and changes in forestry programs that might be adopted to achieve various forestry goals.

Estimates of prospective timber supplies have been developed for a 50-year period—a very long period in the light of the many uncertainties associated with management and response of forests and forest users to changing conditions—but a short period in the life of most commerical timber stands.

1970 LEVEL OF FOREST MANAGEMENT DEFINED

The average amount of forest management activities prevailing in the 1960's has been assumed to represent the "1970 level of management." In most respects the general intensity of timber management in 1970, as indicated in this section, was not greatly different from the average of recent years. This management level is intended to provide a base level for judging the future outlook with and without intensification of timber growing and utilization.

Forest management includes a variety of activities—protection against fire, insects and disease, reforestation, stand improvement, thinnings, and harvesting practices to assure desirable regeneration. Related to these on-the-ground measures are additional activities in forestry research, technical assistance to landowners and operators, and general educational activities.

These management activities directly influence future timber supplies through their effect on such variables as rates of establishment of seedlings and related additions to forest growing stock, rates of diameter growth, tree mortality, and the amount and distribution of timber removals by diameter and tree classes.

Estimates for these variables in each forest region, and relationships to factors such as stand density and composition, were obtained from forest inventory plots taken mostly during the 1960's. Thus the variables used in developing the projections of timber supplies shown later in this chapter largely reflect the timber culture, protection, and utilization levels and practices of this period.

Forest Fire Control

The most widespread forestry practice in the United States, and in many ways the most important and effective historically, is organized protection against wildfire.

Expenditures.—Direct expenditures of Federal and State forestry agencies, and private cooperators for organized programs of control of wildfires approximated $200 million in 1970 (table 25 and fig. 17). In terms of constant 1967 dollars, direct expenditures for fire prevention and control increased about 30 percent between 1960 and 1970. Expenditures per acre in 1970 averaged about 22 cents per acre protected. Federal fire control organizations averaged about 16 cents per acre protected and State and private fire control organizations about 32 cents per acre.

Forest area burned and fire control expenditures

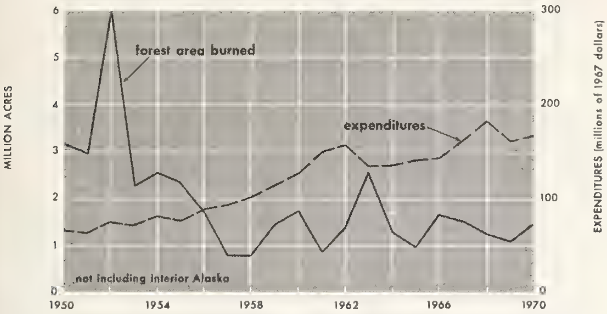


Figure 17

TABLE 25.—*Reported expenditures for forest fire protection, 1950–71*[1]

[Million dollars]

Year	National Forest	Other Federal	State and private[2]	Total	
				Current dollars	1967 dollars
1950	7	1	29	37	66
1951	6	1	32	39	64
1952	10	1	36	47	75
1953	7	1	38	46	72
1954	13	1	39	53	81
1955	12	1	39	52	77
1956	19	2	42	63	88
1957	23	2	45	70	93
1958	23	4	52	79	102
1959	29	7	54	90	113
1960	39	7	57	103	126
1961	55	8	61	124	149
1962	58	9	65	132	156
1963	41	8	67	116	133
1964	39	9	73	121	134
1965	43	10	77	130	140
1966	42	9	86	137	142
1967	54	17	91	162	162
1968	75	19	96	190	181
1969	53	25	101	179	159
1970	58	29	114	201	164
1971[3]	113	39	125	277	213

[1] Includes funds appropriated for prevention, presuppression and suppression of forest fires. Does not include additional expenditures for hazard reduction such as slash burning and prescribed burning, and unreported expenditures by counties, private operators and others. Such expenditures were roughly estimated at $25 million in 1960 and $120 million in 1970.

[2] Cooperative forest fire prevention and control expenditures under Clarke-McNary Law, Section 2.

[3] Preliminary.

Source: U.S. Department of Agriculture, Forest Service and cooperating agencies.

Additional unreported expenditures for hazard reduction, such as slash disposal and prescribed burning,[1] plus other protection efforts not included in organized programs amounted to an estimated $120 million in 1970. Thus total direct and indirect outlays for fire control and hazard reduction in 1970 amounted to about $320 million.

The area protected against wildfires by organized fire control programs has gradually risen to a total of about 973 million acres in the contiguous States, plus some 248 million acres in interior Alaska (table 26). Areas protected include nearly all the 496 million acres classed as commercial timberland, most of the 270 million acres of noncommercial forests, and approximately 170 million acres of nonforest watershed and intermingled nonforest land in the contiguous States. As of 1970, estimates of protection agencies indicated there were some 56 million acres of rural lands still not receiving organized fire protection.

Areas burned.—In contrast to the continuing rise in protection expenditures, there has been no pronounced trend in forest area burned by wildfires during the past 15 years. Areas burned during this period were of course only a fraction of fire losses in earlier decades.

Total areas reported burned in the contiguous States during the 1960's averaged about 3.9 million acres annually (table 26 and fig. 17). This included both forest and nonforest lands in areas such as southern California, and both protected and unprotected areas. Areas burned have fluctuated widely from year to year.

Commercial timberlands burned during the 1960's—of key importance for timber supply analysis—averaged about 1.3 million acres annually. About 6 percent of this burned area was National Forest land; the remaining 94 percent was private and other public land. Areas burned annually during the 1960's averaged about 0.25 percent of the total area of commercial timberland, with rates varying from 0.08 percent of the commercial timberland in National Forests to 0.35 percent on other ownerships.

In spite of increasing protection expenditures, the number of fires starting annually has continued to average about 120,000 per year. As in the case of area burned, rising expenditures for fire prevention and control have in effect been offset by greater risks stemming from improved access and greater public use of forest areas.

Future trends.—Comparison of the relatively stable trend in areas burned by wildfires in the 1960's with the rising trend in control expenditures suggests that continuing increases in fire control expenditures may be necessary to prevent increases in area burned. Risks of fire continue

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[1] Cooper, Robert W. The pros and cons of prescribed burning in the South. Forest Farmer 31(2):10–12, 39–40. November 1971.

TABLE 26.—*Areas protected from forest fires, and areas burned, 1950–71*

Year	Area protected [1]	Area burned [2]				
		Total	Protected areas			Unprotected areas
			Total	Total forest land	Commercial timberland	
	Million acres	*Thousand acres*	*Thousand acres*	*Thousand acres*	*Thousand acres*	*Thousand acres*
Average, 1950–59		8, 377	2, 930	2, 375	n.a.	5, 447
1960	633	4, 452	2, 505	1, 709	n.a.	1, 947
1961	688	3, 036	1, 428	847	n.a.	1, 608
1962	644	4, 050	1, 887	1, 349	1, 254	2, 163
1963	652	7, 105	3, 301	2, 562	2, 440	3, 804
1964	863	4, 194	1, 861	1, 288	1, 127	2, 333
1965	883	2, 645	1, 345	960	894	1, 300
1966	880	3, 899	2, 498	1, 660	1, 413	1, 401
1967	887	4, 571	2, 181	1, 510	1, 363	2, 390
1968	890	3, 263	1, 869	1, 260	1, 069	1, 394
1969	918	2, 582	1, 587	1, 099	968	995
1970	916	3, 165	2, 146	1, 449	1, 131	1, 019
1971 [3]	973	3, 232	2, 499	1, 499	1, 397	753
Annual average, 1960–70	805	3, 906	2, 055	1, 427	1, 284	1, 850

[1] Areas under organized public and private programs. Includes some nonforest watershed and other intermingled nonforest areas. Excludes Interior Alaska with protected area in 1971 of 248 million acres.

[2] Excludes areas burned in Interior Alaska; this averaged 0.5 million acres annually in the period 1960–70.

[3] Preliminary.

Source: U.S. Department of Agriculture, Forest Service, based on reports from State Foresters and other protection agencies.

to increase as a result of greater accessibility of forest lands and rapidly increasing public use of forest areas. As an alternative, further development of technology through continuing research efforts and other measures such as increased prescribed burning and closer timber utilization could help offset increases in fire risks.

The level of area burned is related to the rates of mortality that were used in developing the timber supply projections presented below. In spite of increasing fire risks, it has been assumed for this analysis that improved technology will help avoid an increase in mortality rates with continuance of fire control expenditures at 1970 levels. If this is not achieved prospective timber supplies shown by the base level projections in this chapter could be somewhat overstated.

Insect and Disease Control

Expenditures for pest control during the period 1960–70 averaged about $12 million annually (table 27). About 87 percent of these funds were provided by the Federal Government and 13 percent by cooperating States and/or private organizations.

The major part of the funds provided for pest control have been used to abate epidemic losses in western regions, for example, where attacks of bark beetles, spruce budworm, the Tussock moth, and other pests are often heavy in old-growth stands of that area. Major expenditures were

TABLE 27.—*Expenditures for forest pest control, 1960–71*

[Million dollars]

Year	National Forest	Other Federal	Private and other public	United States total	
				Current dollars	1967 dollars
1960	6. 2	0. 4	1. 5	8. 1	9. 9
1961	6. 5	. 4	1. 5	8. 4	10. 1
1962	8. 0	. 7	2. 1	10. 8	12. 7
1963	11. 6	. 8	3. 4	15. 8	18. 2
1964	8. 9	1. 0	2. 5	12. 4	13. 8
1965	8. 6	1. 2	2. 2	12. 0	12. 9
1966	9. 9	1. 2	2. 6	13. 7	14. 2
1967	10. 1	1. 2	2. 8	14. 1	14. 1
1968	10. 0	. 8	2. 9	13. 7	13. 0
1969	10. 1	. 9	2. 9	13. 9	12. 4
1970	7. 7	. 7	2. 8	11. 2	9. 3
1971	9. 3	. 7	3. 7	13. 7	10. 5

Source: U.S. Department of Agriculture, Forest Service and cooperating agencies.

also made in prior years for control of blister rust in western white pine stands but these efforts to control this important disease were not considered sufficiently effective and this program consequently was largely phased out during the 1960's.

In the South recent expenditures for pest control have been mostly for locating and controlling bark beetles, the most damaging insect in this area. Some control programs are directed against other bark beetles, tipmoths, sawflies, pales weevil, leaf miners, and other insects. Attention is also being given to control of insects which damage cones and seeds, particularly in seed orchards. Diseases such as fusiform rust on loblolly and slash pine, brown spot, littleleaf disease, and fomes annosus also cause serious mortality. Control methods are available for fomes annosus, and tree breeding for genetic resistance offers a strong possibility for controlling fusiform rust in the future.

In the North efforts have mainly been concentrated on control of such destructive agents as white pine blister rust, the gypsy moth, oak wilt, the spruce budworm, and jack-pine budworm.

Reforestation

Planting of forest trees increased sharply during the 1950's from about one-half million acres to a peak of 2.1 million acres during the height of the Soil Bank Program in 1959 (table 28 and fig. 18). Planting declined sharply in the early 1960's to about 1.3 million acres then trended upward again. The average area planted during the decade of the 1960's approximated 1.5 million acres—about 50 percent higher than the average for the 1950's.

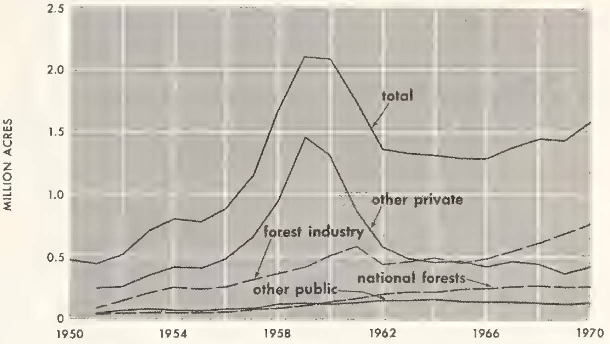
Accurate data are not available on survival of trees planted but field estimates suggest an average survival rate of around 85 percent in the South and 70 to 75 percent in the West and the North. Estimates of State Foresters indicate some continuing improvement in current survival rates, particularly where complete site preparation precedes planting or direct seeding.

In addition to these planting efforts, site preparation for natural regeneration covered an estimated 250,000 acres annually during the 1968–70 period.

Planting by section and ownership.—Planting in the South has accounted for about 60 percent of the total area recently planted or direct seeded in the United States, or an average of about 0.9 million acres annually during the 1960's (table 28 and fig. 18). Areas planted in this region declined sharply in the early 1960's but has shown some upward trend in recent years. Planting in the North and Pacific Coast States each accounted for approximately one-fifth of recent plantings.

Planting on farm and miscellaneous private lands accounted for a major part of the total area planted or seeded during the 1950's, particularly during the period of the Soil Bank program when payments were made for cropland retirement. In the 1960's, however, planting on these ownerships declined sharply, while planting on forest industry lands climbed to over half the total reforestation program.

Area planted and direct seeded, by ownership class



Area planted and direct seeded, by section

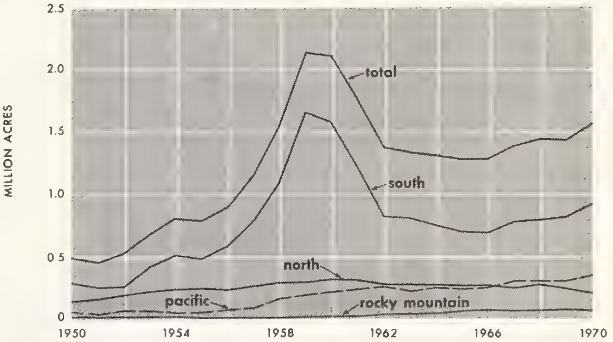


Figure 18

For the decade of the 1960's industrial and farm and miscellaneous private owners each averaged about 37 percent of the total planting effort. About 15 percent of the area planted in the 1960's was in National Forests, and 9 percent in other public ownerships.

Artificial versus natural regeneration.—Planting and seeding of forest trees, although substantial, has covered a relatively small part of the area harvested annually. Forest owners still rely on natural regeneration to restore most stands after logging, and in a large part of the United States this is an effective and economic method of regenerating forest cover. Exact data are not available on the area of forest land harvested annually in the United States but this might amount to as much as 8 million acres per year, including both partial and complete harvesting of timber.

Only part of the 1.5 million acres planted annually during the 1960's was on recently logged

TABLE 28.—*Areas planted and direct seeded by section and ownership class, 1950–71*

[Thousand acres]

Fiscal year	Total United States	Section				Ownership class			
		North	South	Rocky Mountains	Pacific	National Forest	Other public	Forest industry	Farm and miscellaneous private
1950	488	137	285	15	52	45	54	153	237
1951	453	164	245	15	29	46	49	106	253
1952	520	191	250	15	63	50	67	143	260
1953	710	212	420	17	60	53	89	217	352
1954	808	236	506	17	49	54	70	265	419
1955	779	242	482	5	51	56	72	239	413
1956	886	235	574	7	70	61	84	257	484
1957	1, 138	258	782	7	91	85	86	311	657
1958	1, 533	285	1, 080	7	161	89	119	370	955
1959	2, 117	283	1, 642	13	179	112	123	417	1, 465
1960	2, 100	308	1, 567	14	212	134	130	521	1, 315
1961	1, 761	302	1, 205	18	235	163	140	588	870
1962	1, 366	270	816	27	253	198	151	443	573
1963	1, 325	270	798	37	221	221	151	467	486
1964	1, 313	269	756	42	246	208	161	485	460
1965	1, 285	268	708	64	245	233	136	455	461
1966	1, 281	265	696	69	251	237	144	475	425
1967	1, 373	245	769	65	294	257	132	527	457
1968	1, 439	281	795	69	294	269	128	604	437
1969	1, 431	250	808	73	300	257	127	681	367
1970	1, 577	225	925	70	357	261	131	763	422
1971	1, 667	271	1, 002	84	310	267	124	895	381
1960–70 Average	1, 477	268	895	50	264	222	140	545	570
Percent of total	100	18	61	3	18	15	9	37	39

Note: Data may not add to totals because of rounding.

Source: U.S. Department of Agriculture, Forest Service, and cooperating agencies.

lands. In many areas planting of abandoned fields no longer used for crops or pastures made up a major part of the total planting effort. Thus in South Carolina roughly half of the area planted in the 1960's was estimated to be on former crop or pasture land. On the other hand, on National Forests and other ownerships in the West a major portion of the planting has been on recent cutovers, with some limited planting of old burns and cutovers and some replanting of areas difficult to regenerate.

The scale of current planting efforts may be further illustrated by comparison with the total area of commercial timberland. Thus for the decade of the 1960's, areas planted comprised about 8.3 percent of the commercial timberland owned by forest industries, 3.1 percent of nonindustrial private ownerships, 2.3 percent of National Forest lands, and 1.9 percent of other public holdings.

For many years practically all artificial reforestation involved planting of seedlings raised in nurseries. In recent years, however, effective methods have been developed for direct seeding of species such as longleaf pine and Douglas-fir. Direct seeding consequently increased from 8 percent of the total area planted in 1960 to 15 percent in 1971, that is, about 243 thousand acres. Almost half of the direct seeding effort in 1971 was in the South, about 40 percent in the Pacific Coast States, and one-tenth in other sections. Three-fourths of the area direct seeded was on forest industry lands and the remainder on public ownerships.

Environmental constraints on use of persistent pesticides could result in some decline in future direct seeding programs unless more effective means of controlling rodents and other pests can be developed.

Reforestation costs.—Costs of planting and seeding approximately doubled during the 1960's, according to data for the National Forests. Such increases in costs were attributable to such factors as higher labor costs, the increasing need for site preparation, and a shift from easily planted areas to more difficult planting sites. Further increases in costs are considered likely unless offset by improved technology from research and development.

Planting costs vary widely by section and local area, depending on planting conditions and the need for site preparation or drainage operations. Assuming an average planting cost of $50 an acre in 1971 and areas planted as indicated in table 28 would point to a total national investment for tree planting in that year of roughly $85 million.

Timber Stand Improvement

Stand improvement practices include such measures as deadening inferior hardwoods and precommercial thinning of young stands. For the period 1968–70, estimates indicate about 1.4 million acres were treated annually—that is, only one-third of one percent of all commercial timberlands in the United States.[2] This is estimated to be somewhat less than areas treated in the early sixties and late fifties.

TSI by section and ownership.—A major part of the reported stand improvement efforts have been concentrated in the South, particularly on lands operated by forest industries. Distribution of this reported TSI work is shown by the following tabulation of average areas treated annually in the period 1968–71:

By region

Region	Thousand acres
South	856
North	202
Rocky Mountain	99
Pacific	256
Total	1, 413

By ownership

Ownership	Thousand acres
National Forest	319
Other public	100
Forest industry	604
Farm and miscellaneous	390
Total	1, 413

TSI costs.—Timber stand improvement costs per acre on National Forests approximately doubled between 1960 and 1970, due primarily to rising labor costs and more intensive treatment. Costs have varied considerably according to method and degree of stand treatment. Assuming an average of $18 per acre in 1970, total annual investments in timber stand improvement for all ownerships in the United States are estimated to have approximated $25 million.

Additional cultural measures not classed as stand improvement include commercial thinnings or other intermediate cuts that produce merchantable material, improved harvesting practices, and prescribed burning. These measures are being increasingly adopted, especially on industrial and public holdings, but estimates of areas covered are not available.

Fertilization

Forest fertilization to date has been quite limited and there is still uncertainty about physical gains that might be realized, environmental impacts, and the costs and financial benefits of fertilization. However, experience to date is highly promising. Forest fertilization by 1969 amounted to an estimated 60,000 acres of forest land on the Pacific Coast treated with nitrogen fertilizers. In the South areas fertilized through 1970 totaled an estimated 180,000 acres. By 1971 forest industries were reported to be applying fertilizer to nearly 150,000 acres annually. Good response has been reported in the South from addition of nitrogen in older stands and phosphorous in poorly drained pine flatwoods of the Gulf and Atlantic Coastal Plain.

Assistance to Forest Landowners

Forestry accomplishments in on-the-ground measures, including planting, stand improvement, timber harvesting, improved utilization, and other practices can be attributed in considerable part to educational, technical assistance, and cost-sharing programs of public and private forestry agencies. Assumptions as to these programs consequently also influence supply projections.

Technical assistance provided forest landowners and operators by Federal and State agencies in 1971 cost $24.1 million. In terms of constant dollars, this program more than doubled between 1950 and 1970, as shown in figure 19. Numbers of foresters providing service to forest landowners and timber operators steadily increased over the years to nearly 1,600 in 1970.

Cost-sharing assistance provided under the Agricultural Conservation Program of the Federal Government amounted to about $6 million in 1970. As shown in figure 19, during the 1950's and 1960's cost-sharing assistance fluctuated widely from less than $3 million annually during the earlier years to a peak of nearly $23 million during the Soil Bank program of 1957–62. In this period tree planting set new records (fig. 18). Most cost-sharing assistance has been for tree planting, with smaller expenditures for timber stand improvement and other practices.

Forestry Research

Supporting the action programs of forest management and protection described above is a program of public and private forestry research that

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[2] U.S. Department of Agriculture. USDA Forestry Planning Committee Annual Accomplishment Reports. Processed.

Public expenditures to aid private forest land owners

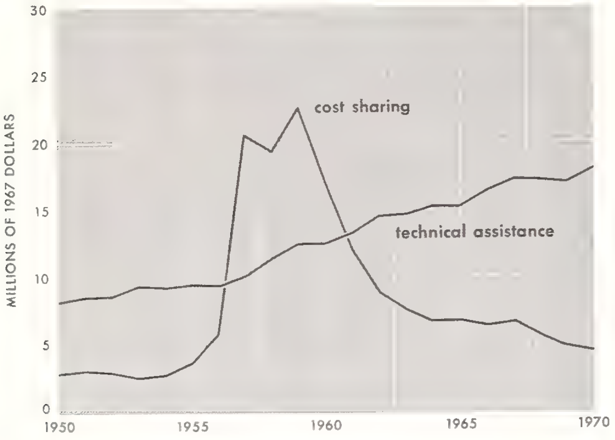

Figure 19

has steadily expanded in recent years. As shown in table 29, total expenditures for forestry research in 1970 amounted to an estimated $208 million. In terms of constant dollars, research expenditures increased about 65 percent during the decade of the 1960's.

Table 29.—*Expenditures for forestry research, by agency, 1960–71*

[Million dollars]

Year	Forest Service [1]	State [1]	Forest industry [2]	Total	
				Current dollars	1967 dollars
1960	16	2	66	84	103
1961	19	4	69	92	110
1962	19	3	75	97	114
1963	26	5	80	111	127
1964	28	4	83	115	124
1965	36	n.a.	89	[3] 135	145
1966	34	8	101	143	148
1967	39	13	97	149	149
1968	40	12	115	167	159
1969	40	18	137	195	175
1970	49	16	143	208	170
1971	52	20	[3] 170	[3] 222	170

[1] Includes research on timber and nontimber uses of the forests and on utilization of timber products; other Federal and private university expenditures not included.

[2] Includes mainly research and development in the forest industries. Related research on equipment, adhesives, etc., in other industries not included.

[3] Estimated.

Sources: National Science Foundation. *Research and development in industry.* Surveys of Science Resources Series, Annual; and U.S. Department of Agriculture, Forest Service and Cooperative State Research Service.

A major part of the public research effort is aimed at improving the technology of forest land management—for timber and for related resources such as water, range, wildlife, and recreation. Such research to date has led to substantial improvements in equipment and techniques relating, for example, to fire prevention, control, and prescribed burning. At least partial control of various insects and diseases is now being achieved as a result of past investigations. Studies of genetic improvement of forest planting stock has led to practical techniques of seed selection and other measures to obtain more productive plantations. Research on cultural measures and harvesting practices also is pointing the way to increased wood yields and incomes from forestry investments.

Continuation of the programs of forestry research at the 1970 level can be expected to result in continued improvements in available technology. In developing the projections of timber supply presented in this chapter some allowances were, therefore, made for improved technology, as in the case of forest fire control where it was assumed that rising hazards would be offset by better techniques of prevention and control.

However, all technological improvements that might result from on-going programs of research, such as genetic improvement for example, cannot be foreseen. To this extent the projections of prospective timber supplies in this analysis may be conservative.

Part of the public research and most of the private research conducted by the forest industries and by related industries which produce equipment and supplies for the forest industries is directed toward problems of timber utilization. This research relates, for example, to improvements in technology for production of logs and other roundwood, improvements in processing roundwood into lumber, pulp, and other products, and more efficient use of wood materials in manufactured products and in construction.

In the analysis of timber demands presented in Chapter V of this report, estimates were made of possible impacts on timber demands of on-going research relating to use of timber products and competing materials. Estimates also were made of potential applications of improved technology that would extend timber supplies by closer utilization in the forest, and by increasing output of lumber, pulp, or other production per unit of roundwood used.

Other Forestry Measures

In addition to the forest protection, management and research activities described above, entailing expenditures of nearly $700 million in 1970, a number of other forestry and related activities also influence timber supply.

Thus road construction and maintenance require major expenditures both by public agencies and by the forest industries for logging operations and forest administration. Expenditures for roads on National Forests in 1970, for example, totaled about $180 million (plus $112 million of timber purchaser construction and maintenance). Substantial outlays for roads were also made on other Federal and State forest lands, on those portions of the Federal, State, and county highway systems that have local impacts on forestry activities, and on private forest holdings.

General administration of forestry operations of both public and private forest owners and forestry agencies involve additional expenditures that have not been evaluated in this study.

Tax provisions of the Federal and State Governments include certain financial benefits to owners of timber properties. Thus the Internal Revenue Code generally permits treatment of income from the sale and cutting of timber as capital gains rather than as ordinary income and this is believed to have been a significant inducement to invest in planting and other forestry practices.

Some 35 States have enacted special forest tax laws to modify State and local property taxation of forest lands and timber in order to encourage improved forest management. However, most of these special laws have been of relatively limited application.

FOREST AREA ASSUMPTIONS FOR PROJECTIONS

Over the past several decades additions to the area of commercial timberland in the United States exceeded losses, with a resulting rise in the area of commercial timberland to about 508 million acres around the year 1962 (table 30). Gains in forest areas were largely the result of natural or artificial reseeding of abandoned farm lands. Losses of forest land stemmed from a wide variety of changes in land use, including withdrawals of land for parks and other recreation areas, urban development, cropland expansion, highways, reservoirs, and other nontimber uses.

During the 1960's the upward trend in commercial timberland area was reversed. More and more private forest properties have been acquired and developed for second homes or other recreational uses. Public lands have been withdrawn and other areas acquired from private owners for public recreation use. Throughout the country forest lands have been engulfed by urban sprawl. Extensive areas have also been cleared for agriculture, whereas additions to forest land from abandoned crop and pasture lands have been declining.

It has been assumed in developing the supply projections shown in this chapter that the area of commercial timberland will continue to decline over the 1970–2020 period by roughly 5 million acres per decade—or a 5 percent reduction for the 50-year period (table 30). Rates of area reductions were assumed to differ somewhat by region and by ownership.

These projections of commercial timberland areas are intended only as reasonable possibilities of future changes. With different area assumptions, projections of timber supplies could be roughly adjusted by applying the same percentage change to both area and supply projections.

In the case of National Forests and other public lands, it is quite possible that some additional areas beyond a 5 percent reduction as shown in table 31 may be removed from the timber supply base in the future. After the 1970 compilation was completed certain areas were selected for study as possible additions to the wilderness system, and some or all of these could be permanently reserved from cutting. These include some 11 million acres of the 56 million acres of roadless areas in the National Forests. Environmental

TABLE 30.—*Area of commercial timberland in the United States, by section, 1952, 1962, and 1970, with projections to 2020*

[Million acres]

Section	1952	1962	1970	Projections			
				1980	1990	2000	2020
North	170. 2	175. 1	177. 9	176. 3	174. 7	173. 1	169. 8
South	192. 1	199. 9	192. 5	191. 1	189. 7	188. 3	185. 5
Rocky Mountains	63. 9	64. 6	[1] 61. 6	60. 5	59. 3	58. 3	56. 0
Pacific Coast	68. 8	68. 5	[2] 67. 6	66. 5	65. 5	64. 7	63. 4
Total United States	495. 0	508. 1	499. 7	494. 4	489. 2	484. 4	474. 7

[1] Includes 5 million acres of National Forest land in the Rocky Mountains not considered in projecting timber supplies. These include small patches and stringers of productive forest land isolated from markets, areas too unstable to harvest with current technology, and lands where nontimber uses predominate.

[2] Includes 1.1 million acres in Hawaii not considered in projecting timber supplies.

TABLE 31.—*Area of commercial timberland, by owner class, 1952, 1962, and 1970, with projections to 2020*

[Million acres]

Owner class	1952	1962	1970	Projections			
				1980	1990	2000	2020
National Forest	93.1	94.9	[1] 91.9	91.2	90.3	89.2	87.4
Other public	46.1	44.4	44.2	43.5	43.1	42.7	41.9
Forest industry	59.5	62.5	67.3	68.4	69.5	70.7	72.9
Farm and miscellaneous private	296.2	306.4	[2] 296.2	291.2	286.3	281.8	272.6
All owners	495.0	508.1	499.7	494.4	489.2	484.4	474.7

[1] Includes 5 million acres of National Forest land in the Rocky Mountains not considered in projecting timber supplies. These include small isolated patches and stringers of productive forest land areas too unstable to harvest with current technology, and lands where nontimber uses predominate.

[2] Includes 1.1 million acres in Hawaii not considered in projecting timber supplies. A large part of this area (0.495 million acres) is in "other public" ownership.

statements also must be prepared before proceeding with development of the remaining unroaded areas. Legislation is pending, moreover, that would extend the wilderness system to eastern National Forests. In 1972 some half million acres of eastern National Forest land was identified for study of suitability as wilderness.

Commercial timberlands in other Federal, State, and local public ownerships, amounting to 44 million acres in 1970, are also projected to decrease somewhat as a result of continuing withdrawals from timber harvesting of areas important for nontimber uses.

The upward trend in area of commercial timberland owned by forest industries through acquisitions from other owners is projected to continue, with a modest increase over the 1970 figure of 67 million acres.

In this initial base projection by far the biggest acreage change is estimated for nonindustrial private owners. Forest areas available for timber production on these holdings were assumed to drop from an estimated 296 million acres in 1970 to 273 million acres by 2020.

A BASE PROJECTION OF TIMBER SUPPLIES WITH 1970 LEVELS OF MANAGEMENT

This section presents a set of estimates of timber supplies that might be available in future decades if the same level and type of timber management as in 1970 continued, and timber harvesting were based upon biological relationships between growth and harvests, for example, as suggested by recent trends. A summary of these base projections for the United States is first presented, followed by a description of supply potentials in each of the four major sections of the United States.

A later section of this chapter presents a set of alternative projections of economically available timber supplies with alternative price levels, related in part to these base projections and in part to other factors bearing on timber operability and availability.

General Procedures

Projections of timber supply were developed by a stand table method utilizing rates of radial growth, mortality, harvesting, and sapling ingrowth, together with growth constraint equations related to basal area and other factors, based upon data from remeasured Forest Survey plots. A computer program was developed to perform the calculations required to project variables by 2-inch tree diameter classes, with specified adjustments for area changes and schedules of timber harvesting.[3] The same procedure was used in reconciling data from successive surveys, and in updating to 1970 Forest Survey data collected over the previous 12 years or so. Growth rates and other inputs used in this procedure reflect the effects of management practices during the 10- to 15-year period prior to 1970 when Survey field measurements were taken. Each projection also was evaluated to assure that supply estimates represented reasonable biological possibilities.

Timber Harvesting Assumptions for Base Projections

In addition to the amount and kind of cultural measures and protection applied to the Nation's commercial timberland, both timber harvesting practices and the timing, amount, and composition of timber harvests in relation to growth and inventories will have major impacts on future roundwood supplies.

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[3] Larson, Robert W., and Marcus H. Goforth. TRAS—A computer program for the projection of timber volume. U.S. Dept. Agric., Agric. Handb. 377, 24 p. June 1970.

This initial base projection of roundwood timber supplies that might be biologically available over the 1970–2020 period was developed with the following assumptions:

Eastern forests.—In the East, total removals of both softwood and hardwood growing stock in cubic feet, and sawtimber in board feet, were assumed to rise from the 1970 trend level to a balance with net growth in all sizes of timber by the year 2000 and thereafter. The estimates of growth—which in this initial assumption constrains available removals and roundwood supplies—assume continuing biological relationships between variables such as radial growth and stand basal area similar to those prevailing in the 1950's and 1960's as indicated by remeasured Forest Survey plots.

These assumptions do not mean that landowners would necessarily be willing and able to sell all of this "available" supply of roundwood, nor that plant capacity would actually be constructed to use all of this projected supply, but rather that these volumes of removals would be physically possible under the management, area, and harvesting assumptions specified. It is readily apparent that there are many possible alternative trends in future removals determined by such factors as owner objectives and timber prices and market conditions, as indicated in the final part of this chapter.

Western public lands.—On public lands in the West, it was assumed that the allowable cut of timber as estimated in 1970 would be continued through the projection period—even though some reductions of allowable cuts might be required after the projection period, or even before, unless management is intensified above 1970 levels. Extensive road construction by the public and by timber operators will be required to harvest the available timber on these public lands, much of which was still in unroaded areas in 1970.

The rate of timber harvesting of National Forests and other public lands could be modified by changes in management policy, and/or by intensified management as pointed out in Chapter III, but for this analysis existing policies as of 1970 were accepted in evaluating the timber supply outlook.

The harvesting of timber on National Forests and certain other public lands is influenced significantly by requirements for multiple-use management of forest areas. Such management is designed not only to produce timber on a sustained basis but also to maintain the quality of waterflows, protect aesthetic values and wildlife habitat, and accommodate rapidly growing numbers of recreational visitors.

Harvesting timber in such a way as to achieve such multiple-use goals can be expected to be of increasing importance on public lands and extend to some degree to privately owned lands as well. Such increases in emphasis on environmental considerations reflect the growing values placed on forest resources by an expanding population with more available time, money, and mobility.

Although allowable harvests on public lands have been set with allowances for nontimber uses, it is possible that further adjustments in timber management may be required.

Timber harvesting has been especially challenged in the case of clearcutting, particularly on public lands, because of aesthetic and environmental impacts. From a timber growing standpoint, on the other hand, clearcutting is considered to be the most effective harvesting alternative in many forest areas to avoid problems such as excessive blowdown of reserved trees and to obtain satisfactory regeneration of desirable species. Various studies have shown that even-aged silviculture with some form of clearcutting favors regeneration of the more desirable species such as Douglas-fir in the Pacific Northwest, southern pine, or Appalachian hardwoods such as yellow-poplar, walnut, black cherry, and preferred oaks. Such management also makes possible concentration of logging activities and stand improvement operations, with resulting savings in costs. Complete removal of existing stands followed by planting also permits reforestation with genetically improved stock, and may be the only practical way to convert hardwoods to more productive softwood stands.

In spite of such biological and economic considerations, the need to balance environmental and commodity uses may require additional modifications of timber harvesting and regeneration practices, particularly on National Forest and other public lands.[4] Any substantial modifications of harvesting or other management practices to give greater emphasis to nontimber uses than assumed in this study would likely require a reduction of the supply projections presented below.

Western private lands.—On private lands in the West estimates were made of the prospective removals of timber that could reasonably be expected with 1970 levels of management and operating practices. These estimated removals decline rather sharply in the projection period to a rough balance with growth and removals by the year 2020.

Roundwood supplies.—The estimates of timber supplies presented in this section are in terms of roundwood products, including both products from growing stock and from nongrowing stock sources. Related information on logging residues and other removals are also included to show total removals from inventories, as well as net growth, mortality, and inventories. In estimating available supplies of roundwood, utilization standards were keyed primarily to practices of 1970 but with some allowance for increased use of logging residuals as a result of improvements in technology that appear likely with ongoing programs of research and development.

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[4] See, for example: U.S. Department of Agriculture Forest Service. National Forest management in a quality environment—timber productivity. 66 p. 1971.

These supply projections are believed to represent reasonable biological possibilities with a continuation of recent trends in forest conditions and management. They are also designed to provide a partial basis for judging possible changes in roundwood supplies in response to alternative price trends, as indicated in the final section of this chapter, and in response to alternative management levels, as indicated in the following chapter.

SUMMARY OF BASE PROJECTIONS OF SUPPLIES FOR THE UNITED STATES

A summary of timber removals, net growth, mortality, roundwood supplies, and timber inventories in the 1952–70 period, and projections for

TABLE 32.—*Timber removals, net growth, mortality, supplies of roundwood products, and inventories in the United States, 1952, 1962, and 1970, with projections (1970 level of management)* [1] *to 2020*

[Billion cubic feet]

Item	1952	1962	1970	Projections			
				1980	1990	2000	2020
SOFTWOODS							
Removals from growing stock:							
Roundwood products	6.6	6.5	8.4	9.5	10.1	10.9	11.1
Logging residues	.9	.8	.9	.9	.8	.8	.7
Other removals	.3	.3	.3	.4	.4	.4	.4
Total	7.8	7.6	9.6	10.8	11.3	12.1	12.2
Net growth	7.8	9.3	10.7	11.3	11.6	11.6	11.9
Mortality	2.6	2.7	2.8	2.8	2.9	3.0	3.0
Roundwood supplies:							
From growing stock	6.6	6.5	8.4	9.5	10.1	10.9	11.1
From other sources [2]	.8	.7	.6	.6	.6	.6	.5
Total	7.4	7.2	9.0	10.1	10.7	11.5	11.6
Inventory of growing stock	411.0	427.2	431.9	436.4	442.1	442.7	437.8
HARDWOODS							
Removals from growing stock:							
Roundwood products	2.6	2.4	2.7	4.8	5.9	7.0	7.0
Logging residues	.8	.6	.7	.8	.9	.9	.7
Other removals	.7	1.2	1.0	.3	.3	.3	.3
Total	4.1	4.2	4.4	5.9	7.1	8.2	8.0
Net growth	6.1	7.1	7.9	8.2	8.2	8.0	7.8
Mortality	1.3	1.5	1.7	2.0	2.1	2.2	2.1
Roundwood supplies:							
From growing stock	2.6	2.4	2.7	4.8	5.9	7.0	7.0
From other sources [2]	.8	.6	.5	.4	.4	.4	.4
Total	3.4	3.0	3.2	5.2	6.3	7.4	7.4
Inventory of growing stock	172.1	196.7	217.0	245.9	262.9	267.6	268.9

[1] Plus other area and harvesting assumptions specified in this chapter.

[2] Includes roundwood products from rough and rotten trees, dead trees, limbs, and trees on noncommercial and nonforest land.

Note: Estimates are for trend levels and consequently may differ from actual figures for the specified years.

TABLE 33.—*Sawtimber removals, net growth, mortality, supplies of roundwood products, and inventories in the United States, 1952, 1962, and 1970, with projections (1970 level of management)* [1] *to 2020*

[Billion board feet]

Item	1952	1962	1970	Projections			
				1980	1990	2000	2020
SOFTWOODS							
Removals from sawtimber:							
Roundwood products	35.3	34.1	43.5	45.6	47.6	50.8	50.1
Logging residues	2.6	2.3	2.5	2.3	2.0	1.8	1.5
Other removals	1.3	1.3	1.7	1.5	1.6	1.6	1.6
Total	39.2	37.7	47.7	49.4	51.2	54.2	53.2
Net growth	29.5	34.7	40.3	43.3	45.7	47.2	48.4
Mortality	11.9	11.6	11.3	10.8	10.6	10.4	10.0
Roundwood supplies:							
From sawtimber	35.3	34.1	43.5	45.6	47.6	50.8	50.1
From other sources [2]	3.5	3.4	3.4	3.2	3.3	3.4	3.8
Total	38.8	37.5	46.9	48.8	50.9	54.2	53.9
Inventory of sawtimber	1,978.9	1,955.5	1,905.3	1,823.0	1,777.1	1,724.6	1,621.9
HARDWOODS							
Removals from sawtimber:							
Roundwood products	11.3	10.0	11.2	14.4	17.1	19.5	19.4
Logging residues	.9	1.0	1.2	1.1	1.0	1.0	.8
Other removals	1.1	1.6	2.6	.7	.8	.8	.7
Total	13.3	12.6	15.0	16.2	18.9	21.3	20.9
Net growth	15.6	17.6	19.7	20.8	21.0	20.9	20.3
Mortality	3.1	3.6	4.0	4.3	4.6	4.7	4.7
Roundwood supplies:							
From sawtimber	11.3	10.0	11.2	14.4	17.1	19.5	19.4
From other sources [2]	.8	.8	1.1	1.1	1.1	1.1	1.1
Total	12.1	10.8	12.3	15.5	18.2	20.6	20.5
Inventory of sawtimber	433.1	474.8	515.5	572.8	608.3	618.8	611.6

[1] Plus other area and harvesting assumptions specified in this chapter.

[2] Includes roundwood products from rough and rotten trees, dead trees, trees on noncommercial or nonforest land, and from trees of less than sawtimber size used as saw logs.

Note: Estimates are for trend levels and consequently may differ from actual figures for the specified years.

1980–2020, are presented in table 32 in cubic feet, and in table 33 in board feet.[5] These base projections reflect management levels of 1970 and related area and cutting assumptions specified earlier.

The estimates of removals, net growth, and inventories developed in this study refer to growing-stock trees, including sawtimber trees, on commercial timberland, excluding rough and rotten trees, salvable dead trees, and trees on other types of land. Estimates of roundwood supplies available to forest industries, on the other hand, include material from both growing stock and these other sources.

Trends in Timber Removals

Annual removals of softwood growing stock increased about 23 percent between 1952 and 1970 to a total of 9.6 billion cubic feet (table 32 and fig. 20). Projections of available softwood removals

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[5] As indicated in table footnotes in Chapter I, data shown for 1952 and 1962 may differ from figures in previous publications because of revisions to insure comparability with 1970 definitions and specifications, or because of adjustments based on new information from Forest Survey plots. Figures also are "trend level" estimates and may differ from actual figures for the specified years.

Net growth and removals of growing stock in the United States

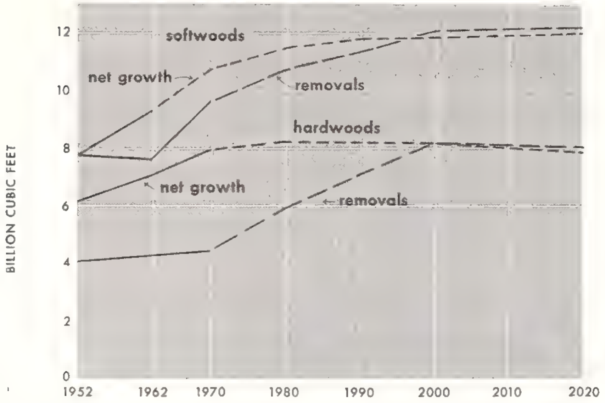

Figure 20

rise a further 26 percent by 2000 to 12.1 billion cubic feet. This increase in removals is associated with a slight increase in inventories of growing stock.

Recent removals of hardwood growing stock rose slowly from 1952 to 1970 but available removals in the future are projected to increase at a much more rapid rate than softwoods, that is, from 4.4 billion cubic feet in 1970 to 8.2 billion cubic feet in 2000—an increase of 86 percent.

Sawtimber removals.—Removals of softwood sawtimber rose some 22 percent between 1952 and 1970 to about 47.7 billion board feet (table 33 and fig. 21). Projected removals increase a further 14 percent by 2000 to 54.2 billion board feet. The smaller increase in projected supplies of available softwood sawtimber in contrast to the projected increase for softwood growing stock removals reflects prospective changes in the distribution of timber harvesting by size class resulting in part from continuing depletion of western old-growth timber. These increases in removals reflect the cutting and other assumptions outlined earlier and differ from projections related to price shown in a later section of this chapter.

Net growth and removals of sawtimber in the United States

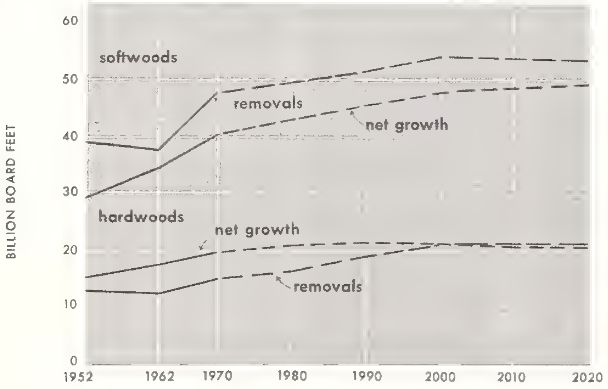

Figure 21

Annual removals of hardwood sawtimber increased about 13 percent between 1952 and 1970 (table 33). As in the case of softwoods, the projection of a 42 percent increase in available removals of hardwood sawtimber is much less than the projected gain for growing stock.

Components of removals.—Roundwood products such as saw logs and pulpwood comprised some 87 percent of all softwood removals in 1970, but only 63 percent of total hardwood removals (table 34).

Logging residues made up 10 percent of the softwood removals and other removals for land clearing, withdrawals, etc., accounted for 3 percent. For hardwoods, on the other hand, logging residues made up 15 percent of the total and other removals 22 percent.

In the base projection assuming 1970 management levels it was assumed that residues from logging operations, as a percent of total removals, will decline in the years ahead for several reasons. Improvements in equipment for handling, transporting, and converting timber, for example, along with expanding markets makes possible various improvements in timber utilization. Technological developments stemming from current research and development efforts are expected to continue, along with growth in markets for fiber products. Also, environmental considerations appear likely to require closer utilization of timber on areas harvested, particularly on public lands. A further factor favoring closer utilization is the continuing increase in numbers of large integrated firms in the forest industries which have multiproduct options and facilities to utilize entire trees for optimum combinations of lumber, pulp, particleboard, or other products.

Logging residues from softwood growing stock consequently are projected to drop from about 9 percent of total removals in 1970 to 6 percent by the year 2000, with roundwood products output increasing correspondingly (table 34). Complete use of logging residues is not considered economically feasible even with higher prices because of the scattered location and poor quality of much of the material left after logging.

Net Growth and Mortality

Trends in net growth, which have a major bearing on the availability of timber removals, rose substantially in the 1952–70 period, and projections indicate further moderate increases. Net growth of softwood growing stock increased 37 percent between 1952 and 1970 to 10.7 billion cubic feet, and is projected to increase a further 8

TABLE 34.—*Components of growing stock removals in the United States, 1952, 1962, and 1970, with projections to 2020*

[Percent]

Component	1952	1962	1970	Projections			
				1980	1990	2000	2020
SOFTWOODS							
Roundwood products	85	86	87	88	89	90	90
Logging residue	11	10	10	8	7	6	6
Other removals	4	4	3	4	4	4	4
Total removals	100	100	100	100	100	100	100
HARDWOODS							
Roundwood products	63	57	63	81	83	85	87
Logging residue	20	14	15	13	12	11	9
Other removals	17	29	22	6	5	4	4
Total removals	100	100	100	100	100	100	100

percent by 2000 (table 32 and fig. 20). Under the cutting assumptions outlined earlier, net growth continues to exceed removals until reaching approximate balance in the year 1990.

Net growth of hardwood growing stock increased in the 1952–70 period to 7.9 billion cubic feet, a rise of 30 percent. However, because of the heavy stocking attained in most hardwood stands, projected net growth rises only 4 percent more by 1980. Net growth in cubic feet is projected to decline slightly thereafter as a result of heavy stocking attained under the specific management assumptions of this section and assumed loss of forest land to other uses.

Estimates of mortality, under the assumption of 1970 levels of management, change relatively little during the projection period. Mortality is in considerable part a reflection of the inventory of old-growth timber held over the projection period.

For softwoods, mortality is projected to rise slightly from 2.8 billion cubic feet in 1970. Hardwood mortality also is estimated to rise with increasing stand density from 1.7 billion cubic feet in 1970 (table 32). Mortality of softwood sawtimber, amounting to 11.3 billion board feet in 1970, is estimated to decline somewhat over the projection period as old-growth timber stands are harvested.

Trees killed by destructive agents are for the most part widely scattered, and it is assumed that only a small portion of these losses will be salvaged for roundwood products unless management is substantially intensified.

Supplies of Roundwood Products

In addition to roundwood products cut from growing stock, some logs and bolts also are produced from other sources, including salvaged dead timber, sections of rough and rotten trees, and trees growing on noncommercial and nonforest lands. Estimated volumes of roundwood products in board feet also include an increasing volume of saw logs from trees having smaller diameters than specified in the standard definition of sawtimber. Increased harvesting of such timber is anticipated as thinning operations expand and new chipping headrigs become more common in the sawmill industry.

Nongrowing stock sources provided 7 percent of the total output of softwood roundwood products in 1970, and 16 percent of all hardwood products (table 32). Many of the trees available from these sources are relatively high-quality trees of species such as walnut growing along fence rows or in narrow strips of forests along streams.

In recent decades, volumes of softwood products from nongrowing stock sources has partially offset volumes of logging residues and other removals, and consequently roundwood production has not differed greatly from growing stock removals (table 32). In the case of hardwoods, however, roundwood production has been much less than removals.

Under the particular assumptions of these base projections, estimates of available roundwood supplies in cubic feet of softwoods rise 28 percent between 1970 and 2000, from 9.0 billion feet to 11.5 billion cubic feet. For hardwoods, projected volumes of available roundwood products that could be harvested under the assumptions of this section rise from 3.2 billion cubic feet in 1970 to 7.4 billion cubic feet by 2000—a rise of 131 percent.

In the case of sawtimber size material measured in board feet, prospective increases in available roundwood supplies are much more moderate. For softwood products projected supplies rise from a log harvest of 46.9 billion board feet in 1970 to about 54 billion board feet by 2000—an increase of 16 percent (table 33 and fig. 22). For hardwoods, the projected increase in available sawtimber size products over the projection period is 67 percent.

Supplies of softwood sawtimber products in the United States, by section

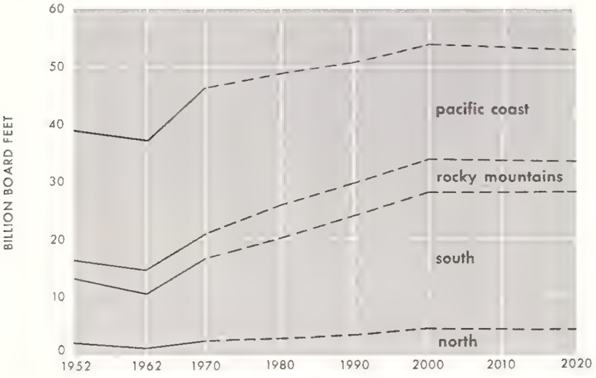

Figure 22

Problems of timber supply and price have been most critical for products derived from larger sizes of timber. Hence these projections in board feet of available roundwood are considered to be more significant than projections of supply in cubic feet, which include all sizes and species of timber and both low- and high-quality trees. Forest industries typically draw much more heavily on larger and better quality sawtimber trees than on other components of the total timber inventory. Thus of the total roundwood produced in 1970, about 80 percent of the softwood products, and 65 percent of the hardwood products, came from the saw-log portion of sawtimber trees.

Roundwood supplies by section.—In 1970 the South and the Pacific Coast each supplied about 42 percent of all softwood roundwood products, as shown in table 35 and the following tabulation of the distribution in percent of softwood roundwood produced by section:

				Projections			
Section	*1952*	*1962*	*1970*	*1980*	*1990*	*2000*	*2020*
North	8	7	6	8	9	10	10
South	41	37	42	46	49	50	50
Rocky Mountains	7	10	10	10	10	11	10
Pacific Coast	44	46	42	36	32	29	30
Total United States	100	100	100	100	100	100	100

TABLE 35.—*Supplies of roundwood products from U.S. forests, by section and species group, 1952, 1962, and 1970, with projections to 2020*

[Million cubic feet]

Section and species group	1952	1962	1970	Projections			
				1980	1990	2000	2020
North:							
Softwoods	603	513	579	803	942	1, 109	1, 113
Hardwoods	1, 378	1, 299	1, 409	2, 428	3, 165	3, 845	3, 799
Total	1, 981	1, 812	1, 988	3, 231	4, 107	4, 954	4, 912
South:							
Softwoods	3, 048	2, 677	3, 745	4, 622	5, 217	5, 768	5, 788
Hardwoods	1, 935	1, 606	1, 668	2, 651	3, 009	3, 327	3, 416
Total	4, 983	4, 283	5, 413	7, 273	8, 226	9, 095	9, 204
Rocky Mountains:							
Softwoods	495	684	852	1, 044	1, 139	1, 275	1, 231
Hardwoods	11	14	11	46	65	89	89
Total	506	698	863	1, 090	1, 204	1, 364	1, 320
Pacific Coast:							
Softwoods	3, 239	3, 324	3, 805	3, 642	3, 376	3, 332	3, 491
Hardwoods	35	62	85	82	96	105	114
Total	3, 274	3, 386	3, 890	3, 724	3, 472	3, 437	3, 605
Total United States:							
Softwoods	7, 387	7, 199	8, 981	10, 111	10, 675	11, 484	11, 622
Hardwoods	3, 358	2, 980	3, 173	5, 207	6, 334	7, 365	7, 418
Total	10, 745	10, 179	12, 154	15, 318	17, 009	18, 849	19, 040

Dependence on the South as a source of softwood roundwood supplies is estimated to continue to increase to half the Nation's total supply, whereas the share of U.S. production coming from the West is projected to decline rather sharply as remaining old-growth timber is harvested.

The South also provided somewhat more than half of the hardwood products harvested in the United States in 1970 (table 35). Over the next few decades, however, prospectively available supplies of hardwoods increase more in the North than in other sections. In terms of cubic feet, the North consequently accounts for over half the projected supply of hardwood products in 2000.

The distribution of roundwood production in terms of board feet is quite different from output in cubic feet. Because of the larger average size of timber in the West, the Pacific Coast region produced 43 percent of the total board footage of roundwood products in 1970, whereas the South accounted for only 34 percent (table 36 and fig. 22). As in the case of cubic feet of products, however, projections show a reversal of this situation, with 42 percent of the projected total output in 2000 coming from the South, compared with 28 percent from the Pacific Coast.

Roundwood supplies by owner class.—Farm and miscellaneous private ownerships have long been the principal source of roundwood products. Thus of the 12.2 billion cubic feet of roundwood products harvested in 1970, nearly half was derived from these farm and miscellaneous private holdings (table 37). About one-fourth of the total came from land owned by forest industries. Public lands also contributed about a quarter of the total, as shown by the following tabulation of percent of cubic feet of roundwood products derived from each owner class:

Owner class	*1952*	*1962*	*1970*	*Projections*			
				1980	*1990*	*2000*	*2020*
National Forest	8	16	17	17	16	15	15
Other public	5	7	7	7	8	9	9
Forest industry	30	28	28	22	20	19	21
Farm and miscellaneous private	57	49	48	54	56	57	55
All owners	100	100	100	100	100	100	100

In terms of board feet, the distribution of roundwood harvested shows a heavier concentration of cutting on forest industry and National Forest lands (table 38 and fig. 23)—an indication of the relative concentration of larger diameter timber inventories in these holdings.

TABLE 36.—*Supplies of sawtimber products from U.S. forests, by section and species group, 1952, 1962, and 1970, with projections to 2020*

[Million board feet]

Section and species group	1952	1962	1970	Projections			
				1980	1990	2000	2020
North:							
Softwoods	1, 898	1, 488	2, 115	2, 390	3, 014	3, 793	3, 793
Hardwoods	4, 300	4, 430	6, 083	7, 648	9, 997	12, 139	11, 994
Total	6, 198	5, 918	8, 197	10, 038	13, 011	15, 932	15, 787
South:							
Softwoods	11, 337	9, 292	14, 366	17, 586	20, 882	23, 836	23, 919
Hardwoods	7, 690	6, 139	5, 914	7, 368	7, 602	7, 752	7, 830
Total	19, 027	15, 431	20, 280	24, 954	28, 484	31, 588	31, 749
Rocky Mountains:							
Softwoods	3, 126	4, 189	5, 273	5, 585	5, 648	5, 915	5, 511
Hardwoods	15	19	13	108	148	195	191
Total	3, 141	4, 208	5, 286	5, 693	5, 796	6, 110	5, 702
Pacific Coast:							
Softwoods	22, 439	22, 540	25, 182	23, 264	21, 323	20, 647	20, 722
Hardwoods	122	201	322	380	435	469	503
Total	22, 561	22, 741	25, 504	23, 644	21, 758	21, 116	21, 225
Total United States:							
Softwoods	38, 800	37, 510	46, 936	48, 825	50, 867	54, 191	53, 945
Hardwoods	12, 127	10, 788	12, 331	15, 505	18, 182	20, 556	20, 518
Total	50, 927	48, 298	59, 267	64, 330	69, 049	74, 747	74, 463

TABLE 37.—*Supplies of roundwood products from U.S. forests, by owner class and species group, 1952, 1962, and 1970, with projections to 2020*

[Million cubic feet]

Owner class and species group	1952	1962	1970	Projections			
				1980	1990	2000	2020
National Forest:							
Softwoods	838	1, 605	1, 926	2, 309	2, 427	2, 547	2, 551
Hardwoods	60	79	90	210	287	370	378
Total	898	1, 684	2, 016	2, 519	2, 714	2, 917	2, 929
Other public:							
Softwoods	403	547	685	812	943	1, 089	1, 142
Hardwoods	125	125	149	318	433	548	547
Total	528	672	834	1, 130	1, 376	1, 637	1, 689
Forest industry:							
Softwoods	2, 700	2, 237	2, 918	2, 759	2, 635	2, 805	2, 993
Hardwoods	486	597	512	619	725	836	902
Total	3, 186	2, 834	3, 430	3, 378	3, 360	3, 641	3, 895
Farm and miscellaneous private:							
Softwoods	3, 445	2, 810	3, 451	4, 230	4, 670	5, 043	4, 936
Hardwoods	2, 688	2, 179	2, 423	4, 061	4, 888	5, 611	5, 592
Total	6, 133	4, 989	5, 874	8, 291	9, 558	10, 654	10, 528
Total United States:							
Softwoods	7, 387	7, 199	8, 981	10, 111	10, 675	11, 484	11, 622
Hardwoods	3, 358	2, 980	3, 173	5, 207	6, 334	7, 365	7, 418
Total	10, 745	10, 179	12, 154	15, 318	17, 009	18, 849	19, 040

The projections of this chapter indicate that relatively constant proportions of roundwood harvests will be maintained from National Forests and other public owners. The share of output from forest industry lands is projected to drop about 7 percentage points, with farm and miscellaneous owners sharing a corresponding increase.

Timber Inventories

Hardwood growing stock inventories increased substantially from 1952 through 1970 at an average annual rate of 1.45 percent for growing stock and 1.06 percent for sawtimber (tables 32 and 33).

Softwood growing stock inventories increased more slowly at an average of 0.28 percent annually. Softwood sawtimber inventories, on the other hand, decreased 0.21 percent annually as a result of relatively heavy cutting of this preferred raw material and the limited growth obtained in western old-growth stands.

Under the management and related assumptions adopted in this section, projected inventories of softwood growing stock remain roughly constant, while softwood sawtimber inventories drop about 15 percent. Hardwood inventories in both cubic feet and board feet continue to rise between 1970 and 2020, although at a considerably slower rate than previously.

As indicated earlier, alternative projections related to different price assumptions are presented later in this chapter.

PROJECTIONS OF TIMBER SUPPLIES IN THE SOUTH

Harvesting of timber in the South increased sharply in the 1960's along with rising timber growth and inventories. Major construction of new pulping and capacity, the rise of a major softwood plywood industry, and expansion of a modernized lumber industry led to more than a 25 percent increase in output of industrial wood products. In 1970 the South accounted for 45 percent of the Nation's output of roundwood products and net growth of timber. The outlook for continued expansion of softwood timber supplies and the potentials for intensification of management emphasize the major importance of this region, particularly for softwoods.

TABLE 38.—*Supplies of sawtimber products from U.S. forests, by owner class and species group, 1952, 1962, and 1970, with projections to 2020*

[Million board feet]

Owner class and species group	1952	1962	1970	Projections			
				1980	1990	2000	2020
National Forest:							
Softwoods	5, 564	10, 402	12, 548	14, 163	14, 672	15, 228	14, 812
Hardwoods	217	332	359	634	910	1, 193	1, 194
Total	5, 781	10, 734	12, 906	14, 797	15, 582	16, 421	16, 006
Other public:							
Softwoods	2, 323	3, 348	4, 236	4, 594	5, 140	5, 790	5, 907
Hardwoods	365	339	497	879	1, 273	1, 679	1, 666
Total	2, 688	3, 687	4, 733	5, 473	6, 413	7, 469	7, 573
Forest industry:							
Softwoods	16, 003	12, 964	16, 352	14, 001	12, 896	13, 321	13, 865
Hardwoods	1, 572	1, 724	1, 774	1, 967	2, 213	2, 456	2, 615
Total	17, 575	14, 688	18, 126	15, 968	15, 109	15, 777	16, 480
Farm and miscellaneous private:							
Softwoods	14, 910	10, 796	13, 801	16, 068	18, 158	19, 851	19, 360
Hardwoods	9, 973	8, 393	9, 701	12, 025	13, 786	15, 228	15, 043
Total	24, 883	19, 189	23, 502	28, 093	31, 944	35, 079	34, 403
Total United States:							
Softwoods	38, 800	37, 510	46, 936	48, 825	50, 867	54, 191	53, 945
Hardwoods	12, 127	10, 788	12, 331	15, 505	18, 182	20, 556	20, 518
Total	50, 927	48, 298	59, 267	64, 330	69, 049	74, 747	74, 463

Supplies of softwood sawtimber products in the United States, by owner class

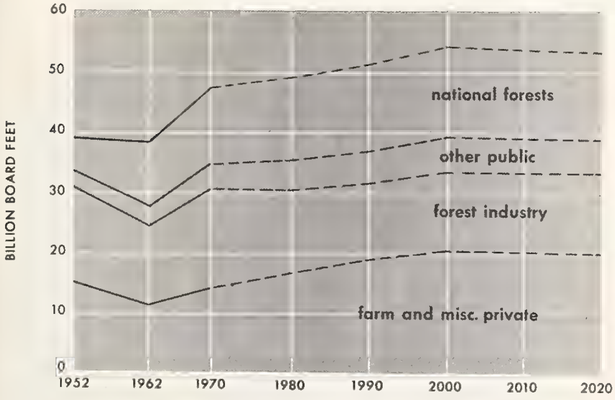

Figure 23

Trends in Forest Area

Recent trends in forest areas and changing land-use patterns in the South point to a smaller area of forest land available for timber production in the future.

Between 1952 and 1962, gains in commercial timberland exceeded losses by some 7.8 million acres, but during the 1962–70 period this trend was reversed, with a net loss of some 7.4 million acres (table 39). Half of the southern States showed decreases in commercial timberland in this recent period, most notably in the Delta States of Mississippi, Arkansas, and Louisiana. Large areas of forest land in these areas have been cleared for agriculture. Reservoirs have inundated sizable areas of choice hardwood lands capable of producing sweetgum, tupelo, and other soft-textured hardwoods. In contrast, most lands reverting to forests have been eroded uplands.

While additional shifts from forest to nonforest uses can be expected, a large portion of the idle farm land left in the wake of rural-to-urban migration has now either reverted to trees or has been planted to pine. With a continuation of the trend toward a larger and more stable agricultural land base in the South, additional reversions of agricultural land to forest do not appear likely to be significant.

In these base projections it has therefore been assumed that commercial timberland will continue to decrease, although at a much slower rate than

TABLE 39.—*Area of commercial timberland in the South, by owner class, 1952, 1962, and 1970, with projections to 2020*

[Million acres]

Owner class	1952	1962	1970	Projections			
				1980	1990	2000	2020
National Forest	10. 4	10. 7	10. 8	10. 7	10. 6	10. 4	10. 2
Other public	6. 4	6. 5	6. 5	6. 4	6. 4	6. 3	6. 2
Forest industry	32. 1	34. 1	35. 3	36. 0	36. 6	37. 3	38. 6
Farm and miscellaneous private	143. 2	148. 7	139. 9	138. 0	136. 1	134. 3	130. 5
All owners	192. 1	199. 9	192. 5	191. 1	189. 7	188. 3	185. 5

in the 1960's. During the next 50 years projected areas of commercial timberland decline an average of about 140 thousand acres annually.

It is also estimated that a major part of the loss in commercial timberland will take place on farm and miscellaneous private ownerships—which make up the bulk of the commercial timberlands in this region. For the most part, these holdings of farmers and a wide variety of other owners are in small tracts and many are adjacent to areas likely to experience further urban or other development. In keeping with recent trends, the area in this owner class is assumed to decrease about 7 percent by 2020.

On the other hand, the upward trend in forest area owned by forest industries is assumed to continue. Moderate declines are assumed in areas of commercial timberland in National Forests and other public ownerships, although in view of growing demands for nontimber uses, reductions could be greater than assumed in these projections.

Net growth and removals of growing stock in the South

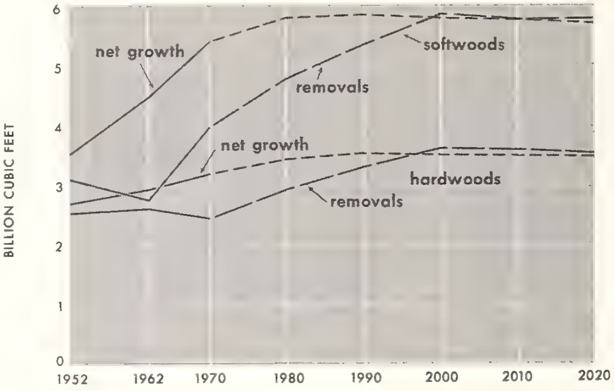

Figure 24

Net growth and removals of sawtimber in the South

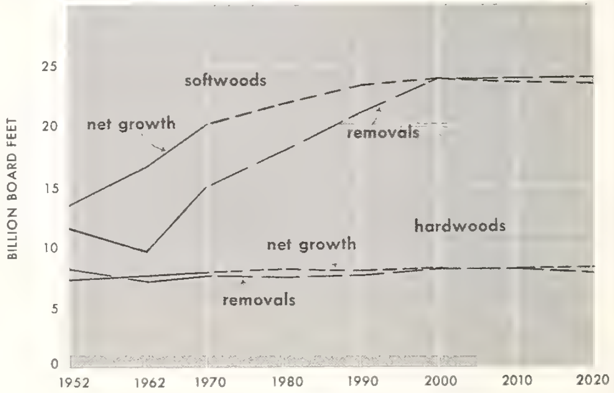

Figure 25

Timber Removals

Removals of softwood growing stock in the South increased substantially in the period 1952–70, while removals of hardwoods showed little change (table 40 and fig. 24).

Under the assumptions of 1970 management levels and a rise in removals to equal net growth by 2000, projected softwood removals increase about 45 percent between 1970 and 2020, compared to 44 percent for hardwoods. These estimates reflect a general emphasis on management of forests for softwoods rather than hardwoods. Many stands tend to revert to hardwoods following harvesting of pine, and hence without such management hardwoods would increase faster than softwoods.

Sawtimber removals.—Removals of softwood sawtimber are estimated to increase from 15 billion board feet in 1970 to 24 billion feet by 2000 (table 41 and fig. 25). This would represent a rise of 59 percent, compared to 47 percent for projected removals from softwood growing stock, largely as a result of widespread development of sawtimber in both natural stands and plantations.

TABLE 40.—*Timber removals, net growth, mortality, supplies of roundwood products, and inventories in the South, 1952, 1962, and 1970, with projections (1970 level of management)* [1] *to 2020*

[Million cubic feet]

Item	1952	1962	1970	Projections			
				1980	1990	2000	2020
SOFTWOODS							
Removals from growing stock:							
Roundwood products	2, 792	2, 444	3, 575	4, 453	5, 049	5, 599	5, 619
Logging residues	196	165	263	260	231	189	111
Other removals	124	171	158	71	76	78	78
Total	3, 112	2, 780	3, 996	4, 784	5, 356	5, 866	5, 808
Net growth	3, 587	4, 481	5, 401	5, 801	5, 865	5, 799	5, 739
Mortality	332	391	457	519	565	582	576
Roundwood supplies:							
From growing stock	2, 792	2, 444	3, 575	4, 453	5, 049	5, 599	5, 619
From other sources [2]	257	234	170	169	168	169	169
Total	3, 049	2, 678	3, 745	4, 622	5, 217	5, 768	5, 788
Inventory of growing stock	55, 115	66, 787	78, 405	90, 453	98, 018	100, 325	99, 396
HARDWOODS							
Removals from growing stock:							
Roundwood products	1, 568	1, 303	1, 437	2, 419	2, 778	3, 096	3, 185
Logging residues	547	421	420	447	456	441	290
Other removals	448	921	630	92	95	97	97
Total	2, 563	2, 645	2, 487	2, 958	3, 329	3, 634	3, 572
Net growth	2, 730	2, 974	3, 208	3, 457	3, 568	3, 561	3, 500
Mortality	621	700	714	759	791	802	788
Roundwood supplies:							
From growing stock	1, 568	1, 303	1, 437	2, 419	2, 778	3, 096	3, 185
From other sources [2]	367	303	231	232	231	231	231
Total	1, 935	1, 606	1, 668	2, 651	3, 009	3, 327	3, 416
Inventory of growing stock	75, 570	78, 256	81, 112	86, 888	90, 421	91, 170	89, 671

[1] Plus other area and harvesting assumptions specified in this chapter.

[2] Includes roundwood products from rough and rotten trees, dead trees, and trees on noncommercial and nonforest land.

Note: Estimates are for trend levels and consequently may differ from actual figures for the specified years.

On the other hand, very little change is projected in available removals of hardwood sawtimber, in spite of a sizable projected increase in growing stock removals. This difference reflects the heavy cutting of larger diameters and the concentration of future volumes in smaller size trees.

Removals by size of material.—About three-fourths of the softwood timber removed in 1970 was derived from trees above 9.0 inches in diameter (fig. 26). Trees 5–9 inches in diameter provided the remaining one-fourth of these removals (table 42).

Material in the saw-log portion of softwood sawtimber trees—of key importance for lumber and plywood production—represented about 66 percent of the estimated total removals in 1970. This proportion of saw-log material is estimated to remain roughly the same in the projection period with the cutting rates assumed in this section.

In the case of hardwoods, removals from the saw-log portion of sawtimber trees in 1970 represented only about half the total removals (fig. 27). The principal change in projected removals is a sizable gain in volume and proportion of trees

TABLE 41.—*Sawtimber removals, net growth, mortality, supplies of roundwood products, and inventories in the South, 1952, 1962, and 1970, with projections (1970 level of management)* [1] *to 2020*

[Million board feet]

Item	1952	1962	1970	Projections			
				1980	1990	2000	2020
SOFTWOODS							
Removals from sawtimber:							
Roundwood products	10,879	8,909	13,868	17,090	20,384	23,338	23,421
Logging residues	543	371	567	541	475	351	81
Other removals	459	565	611	255	278	286	286
Total	11,881	9,845	15,046	17,886	21,137	23,975	23,788
Net growth	13,638	16,668	20,096	21,967	23,310	23,745	23,549
Mortality	883	1,053	1,266	1,563	1,724	1,783	1,766
Roundwood supplies:							
From sawtimber	10,879	8,909	13,868	17,090	20,384	23,338	23,421
From other sources [2]	457	383	498	497	498	498	498
Total	11,336	9,292	14,366	17,587	20,882	23,836	23,919
Inventory of sawtimber	185,571	230,398	275,876	323,285	354,751	365,081	362,093
HARDWOODS							
Removals from sawtimber:							
Roundwood products	7,288	5,743	5,425	6,877	7,111	7,261	7,340
Logging residues	433	561	692	621	573	520	315
Other removals	548	1,042	1,678	228	232	233	233
Total	8,269	7,346	7,795	7,726	7,916	8,014	7,888
Net growth	7,592	7,625	7,932	8,025	7,971	7,852	7,723
Mortality	1,743	1,982	1,943	1,995	2,019	2,013	1,981
Roundwood supplies:							
From sawtimber	7,288	5,743	5,425	6,877	7,111	7,261	7,340
From other sources	402	396	489	491	491	491	490
Total	7,690	6,139	5,914	7,368	7,602	7,752	7,830
Inventory of sawtimber	205,496	204,530	207,975	212,107	213,691	212,951	209,611

[1] Plus other area and harvesting assumptions specified in this chapter.

[2] Includes roundwood products from rough and rotten trees, dead trees, and trees on noncommercial and nonforest land.

Note: Estimates are for trend levels and consequently may differ from actual figures for the specified years.

5–11 inches in diameter, with little change in volumes of available saw-log material (table 42).

Supplies of Roundwood Products

Of the total removals of growing stock in 1970, 89 percent of the softwoods and 58 percent of the hardwoods were utilized as wood products (tables 40 and 43). About 7 percent of the softwood removals and 17 percent of the hardwood removals were left in the woods as logging residues. Other timber removals attributable to land clearing or other withdrawals of land and timber from the timber growing base accounted for 4 percent of all softwood removals in 1970, and 25 percent of all hardwood removals.

Partially offsetting nonproduct removals are products coming from timber that does not qualify as growing stock, such as rough and rotten trees and trees from land not considered commercial timberland. In 1970, about 5 percent of the softwood roundwood produced and 14 percent of hardwood roundwood products came from these nongrowing stock sources (table 40).

The net result of these partially offsetting factors was that in 1970 total output of roundwood products of 3.7 billion cubic feet of softwood growing

Net growth and removals of softwood growing stock in the South, by size of material

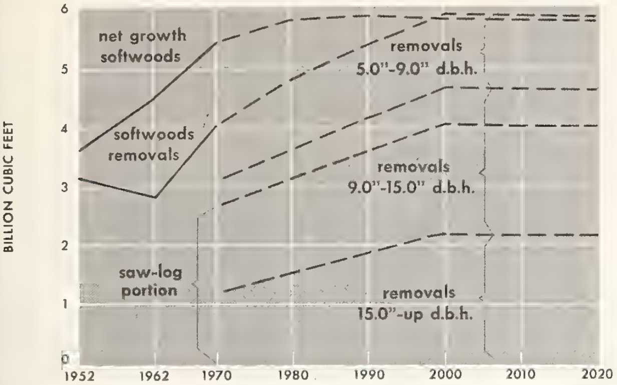

Figure 26

Net growth and removals of hardwood growing stock in the South, by size of material

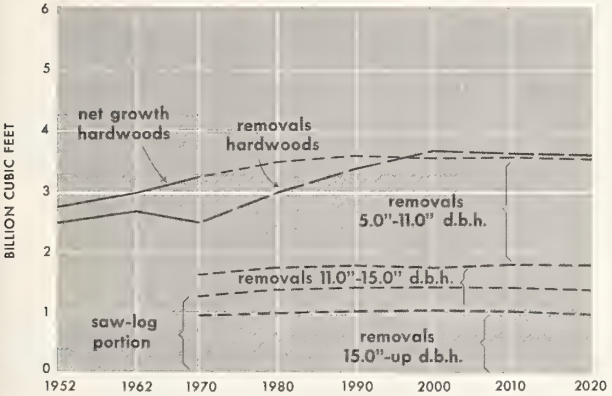

Figure 27

stock was 7 percent less than removals of 4.0 billion cubic feet. For hardwoods, however, total roundwood products, amounting to 1.7 billion cubic feet, were equivalent to only 67 percent of the 2.5 billion cubic feet of removals.

It has been assumed that with expanding markets and improved technology resulting from ongoing research and development, the proportion of total removals going into logging residues and other removals will decline. The biggest change is projected for hardwoods where the proportion of removals going into timber products is projected to increase from 58 percent in 1970 to 89 percent by 2020.

Roundwood supplies by owner class.—Farm and miscellaneous private owners supplied more than two-thirds of the softwood timber products harvested in the South in 1970 (table 44 and fig. 28). These owners also supplied 76 percent of all hardwood products harvested (table 44 and fig. 29). Proportions of total output in board feet were quite similar (table 45). In future decades this owner class is projected to supply larger volumes but a diminishing percentage of all roundwood products.

Though far less important in acreage than farm and miscellaneous private holdings, forest industry lands constituted the second leading source of timber products in the South, with 24 percent of the total output of roundwood in 1970. The proportion of the total products obtained from these lands is projected to increase, particularly for softwoods.

National Forests and other public ownerships provided about 5 percent of all roundwood products harvested in the South in 1970, but because of a large excess of growth over removals these lands are projected to supply up to 10

Supplies of softwood sawtimber products in the South, by owner class

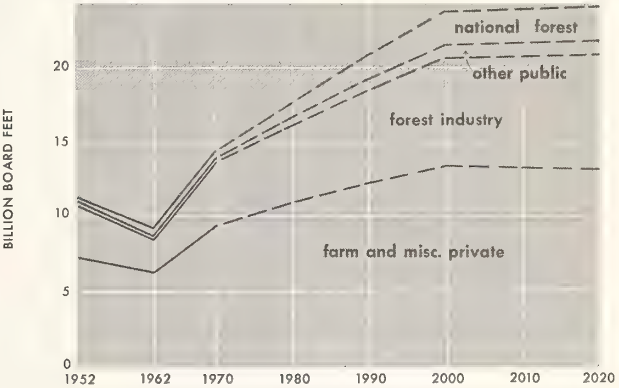

Figure 28

Supplies of hardwood sawtimber products in the South, by owner class

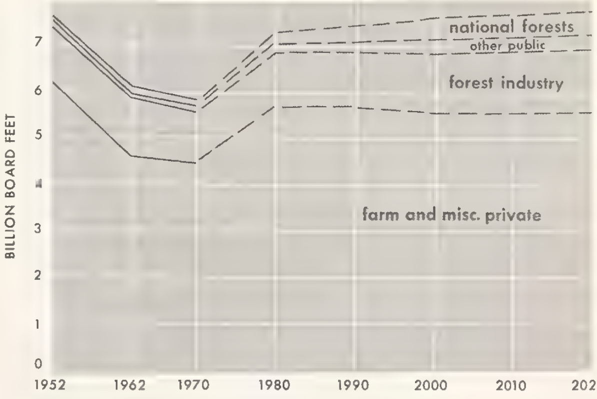

Figure 29

TABLE 42.—*Removals in the South, by size of material, 1970, with projections to 2020*

[Million cubic feet]

Item	1970	Projections				
		1980	1990	2000	2010	2020
SOFTWOODS						
All growing stock	3,996	4,784	5,356	5,866	5,836	5,808
Sawtimber trees	3,019	3,598	4,119	4,609	4,590	4,572
Large sawtimber trees [1]	1,159	1,506	1,835	2,135	2,127	2,120
Saw-log portion	2,626	3,129	3,583	4,009	3,992	3,977
HARDWOODS						
All growing stock	2,487	2,958	3,329	3,633	3,602	3,572
Sawtimber trees	1,609	1,722	1,767	1,787	1,774	1,759
Large sawtimber trees [1]	934	986	1,000	1,012	1,004	996
Saw-log portion	1,279	1,368	1,404	1,420	1,409	1,398

[1] Trees more than 15.0 inches in diameter at breast height.

TABLE 43.—*Components of removals of growing stock in the South, 1952, 1962, and 1970, with projections to 2020*

[Percent]

Component	1952	1962	1970	Projections			
				1980	1990	2000	2020
SOFTWOODS							
Roundwood products	90	88	89	93	94	96	97
Logging residue	6	6	7	5	4	3	2
Other removals	4	6	4	2	2	1	1
Total removals	100	100	100	100	100	100	100
HARDWOODS							
Roundwood products	61	49	58	82	83	85	89
Logging residue	21	16	17	15	14	12	8
Other removals	18	35	25	3	3	3	3
Total removals	100	100	100	100	100	100	100

percent of the total by 2020. On these publicly owned forests production of timber is only one of several management objectives. With the growing concern over the appearance and quality of the outdoor environment throughout the country, the public may call for further modifications in the management of these lands that would be inconsistent with the assumptions used in these projections. Also, a large proportion of the surplus growth on southern National Forests occurs in hardwood stands in the rugged southern Appalachians on sites of relatively low quality. Hence, projections of products output based on the assumption that removals will equal growth by 2000, may be overstated.

Roundwood harvests per acre.—Production of roundwood varied widely by ownership in 1970. Output from forest industry lands averaged 37 cubic feet per acre, compared to 28 cubic feet for farm and miscellaneous private holdings, and 12 cubic feet for National Forests (table 46).

Roundwood production for all owners combined is projected to increase from an average of 28 cubic feet per acre in 1970 to 50 cubic feet by 2020 under the assumption of 1970 management. Forest industry and National Forest lands are expected to support the largest available harvests per acre—approximately 56 cubic feet by 2020, compared to 47 cubic feet for farm and miscellaneous private ownerships.

TABLE 44.—*Supplies of roundwood products in the South, by owner class and species group, 1952, 1962, and 1970, with projections to 2020*

[Million cubic feet]

Owner class and species group	1952	1962	1970	Projections			
				1980	1990	2000	2020
National Forest:							
Softwoods	61	117	103	208	307	404	403
Hardwoods	17	21	24	76	120	165	169
Total	78	138	127	284	427	569	572
Other public:							
Softwoods	92	73	87	127	167	202	201
Hardwoods	46	32	42	80	101	119	123
Total	138	105	129	207	268	321	324
Forest industry:							
Softwoods	829	595	980	1, 194	1, 386	1, 581	1, 659
Hardwoods	334	454	327	385	441	493	533
Total	1, 163	1, 049	1, 307	1, 579	1, 827	2, 074	2, 192
Farm and miscellaneous private:							
Softwoods	2, 066	1, 892	2, 575	3, 093	3, 358	3, 581	3, 525
Hardwoods	1, 538	1, 100	1, 275	2, 110	2, 346	2, 550	2, 591
Total	3, 604	2, 992	3, 850	5, 203	5, 704	6, 131	6, 116
Total South:							
Softwoods	3, 048	2, 677	3, 745	4, 622	5, 217	5, 768	5, 788
Hardwoods	1, 935	1, 606	1, 668	2, 651	3, 009	3, 327	3, 416
Total	4, 983	4, 283	5, 413	7, 273	8, 226	9, 095	9, 204

Removals in Relation to Net Growth

Net growth of growing stock in the South has risen rapidly in recent decades to about 5.4 billion cubic feet of softwood growing stock in 1970, and 3.2 billion cubic feet of hardwoods (table 40 and fig. 24). Growth of sawtimber has shown similar marked increases (table 41 and fig. 25).

Net growth for all ownerships combined exceeded removals in 1970 by 33 percent, a much wider margin than in 1952. A peaking of growth in excess of removals in the early 1960's was a result of unusually low removals combined with increasing growth on a rapidly expanding inventory base.

Under the cutting assumptions underlying these projections, growth of softwoods is estimated to increase about 7 percent by 2000, while available removals rise by 47 percent (table 40). Hardwood net growth is projected to rise about 11 percent by 2000, and available removals 46 percent.

Trends in Net Growth Per Acre

Net growth of timber per acre averaged about 45 cubic feet in 1970—a substantial rise over the estimate of 33 cubic feet in 1952 (table 47). Under the assumptions of these base projections average net growth per acre would reach a level of close to 50 cubic feet per acre of growing stock by 2000. Additional growth of rough and rotten trees that occupy considerable area would add to this projection.

It is also possible that growth will increase more than indicated even at 1970 levels of management as a result of wider use of genetically improved stock and other technological improvements. A factor on the other side is the possibility that growth and inventories on some properties may not be available because of nontimber objectives of forest owners.

On farm and miscellaneous private lands net annual growth per acre in 1970 was somewhat less than the average for all lands, whereas relatively high levels of growth per acre were attained on forest industry and National Forest lands.

The largest excess of growth over removals in 1970 was on public lands, especially on National Forests (tables 46 and 47). On these lands, land-management objectives aimed at building up stands to produce sawtimber were reflected in net growth four times greater than timber removals.

TABLE 45.—*Supplies of sawtimber products in the South, by owner class and species group, 1952, 1962, and 1970, with projections to 2020*

[Million board feet]

Owner class and species group	1952	1962	1970	Projections			
				1980	1990	2000	2020
National Forest:							
Softwoods	257	485	452	1,008	1,651	2,284	2,264
Hardwoods	99	144	119	248	383	517	520
Total	355	629	571	1,256	2,034	2,801	2,784
Other public:							
Softwoods	336	261	311	513	722	922	918
Hardwoods	186	109	148	239	291	333	340
Total	522	370	459	752	1,013	1,255	1,258
Forest industry:							
Softwoods	3,504	2,363	4,263	5,158	6,301	7,339	7,662
Hardwoods	1,171	1,303	1,102	1,183	1,238	1,273	1,352
Total	4,675	3,666	5,365	6,341	7,539	8,612	9,014
Farm and miscellaneous private:							
Softwoods	7,240	6,183	9,340	10,907	12,208	13,291	13,075
Hardwoods	6,235	4,583	4,545	5,698	5,690	5,629	5,618
Total	13,475	10,766	13,885	16,605	17,898	18,920	18,693
Total South:							
Softwoods	11,337	9,292	14,366	17,586	20,882	23,836	23,919
Hardwoods	7,690	6,139	5,914	7,368	7,602	7,752	7,830
Total	19,027	15,431	20,280	24,954	28,484	31,588	31,749

The heaviest cut in relation to net growth has been on private farm and miscellaneous lands, but in 1970 net growth exceeded removals by 22 percent even on these lands.

Growth by forest types.—Net annual growth per acre also varies widely by forest type, largely as a result of differences in site quality and stand composition. Thus pine stands averaged 61 cubic feet per acre of net growth in 1970, compared to 42 cubic feet for oak-pine, 34 cubic feet for oak-hickory, and 38 cubic feet for the lowland oak-gum-cypress type.

About 35 percent of the total forest area in the South, or 68 million acres, qualified as pine type in 1970. These stands include natural pine lands of the Coastal Plain, about 15 million acres of pine plantations, and a substantial area of upland sites where pine became established following cropland abandonment. After harvesting, many of these stands are likely to become oak-pine stands, and without timber stand improvement most of these oak-pine stands will probably revert in time to the oak-hickory type.

Most oak-hickory stands—amounting to nearly 56 million acres in 1970—are capable of supporting pine but in many areas the natural propensity to grow hardwoods is so strong, notably in the southern Appalachians and the Cumberland Plateau, that opportunities to grow pine are not favorable. Many of the oak-hickory seedling and sapling stands are residuals following the removal of pine.

With net growth substantially in excess of removals, a shift in stand size distribution from seedlings and saplings to poletimber and sawtimber can be expected. Hence the proportion of areas in seedlings and saplings is estimated to decline from 38 percent of the commercial timberland in 1970 to 19 percent in 2000. With removals equal to net growth thereafter, a distribution of about 20 percent seedlings and saplings, 30 percent poletimber and 50 percent sawtimber probably could be maintained.

Growth rates.—Net annual growth rates increased from 4.8 percent of the growing stock inventory in 1952 to 5.4 percent in 1970 (table 48). Ingrowth of small trees into measurable size was of particular importance in this period. With a projected buildup of timber inventories in the future, net growth rates are estimated to decline to somewhat less than 5 percent by 2000.

TABLE 46.—*Roundwood harvests per acre in the South, by owner class and species group, 1952, 1962, and 1970, with projections to 2020*

[Cubic feet]

Owner class and species group	1952	1962	1970	Projections			
				1980	1990	2000	2020
National Forests:							
Softwoods	5. 9	10. 9	9. 6	19. 5	28. 9	38. 9	39. 5
Hardwoods	1. 6	2. 0	2. 2	7. 1	11. 4	15. 8	16. 6
Total	7. 5	12. 9	11. 8	26. 6	40. 3	54. 7	56. 1
Other public:							
Softwoods	14. 4	11. 3	13. 3	19. 8	26. 1	32. 1	32. 4
Hardwoods	7. 2	4. 9	6. 5	12. 5	15. 8	18. 9	19. 8
Total	21. 6	16. 2	19. 8	32. 3	41. 9	51. 0	52. 2
Forest industry:							
Softwoods	25. 9	17. 5	27. 7	33. 2	37. 9	42. 4	43. 0
Hardwoods	10. 4	13. 3	9. 3	10. 7	12. 0	13. 2	13. 8
Total	36. 3	30. 8	37. 0	43. 9	49. 9	55. 6	56. 8
Farm and miscellaneous private:							
Softwoods	14. 4	12. 7	18. 4	22. 4	24. 7	26. 7	27. 0
Hardwoods	10. 7	7. 4	9. 1	15. 3	17. 2	19. 0	19. 9
Total	25. 1	20. 1	27. 5	37. 7	41. 9	45. 7	46. 9
All owners:							
Softwoods	15. 9	13. 4	19. 4	24. 2	27. 5	30. 6	31. 2
Hardwoods	10. 1	8. 0	8. 7	13. 9	15. 9	17. 7	18. 4
Total	26. 0	21. 4	28. 1	38. 1	43. 4	48. 3	49. 6

The relatively low percentage growth rates estimated for National Forest lands mainly reflect heavier volumes per acre. Another factor is the inclusion in natural forests of many mountain areas of relatively low site and high proportions of hardwoods which have significantly lower growth rates than softwoods.

Trends in Timber Inventories

As a result of the sizable increases in timber growth relative to removals, timber inventory volumes increased from an average of 680 cubic feet per acre in 1952 to 829 cubic feet in 1970 (table 49). A further buildup of inventory volumes averaging about 23 percent by 2000 is estimated under the assumptions of these base projections.

PROJECTIONS OF TIMBER SUPPLIES IN THE NORTH

The North is of major importance as a source of hardwood timber, accounting for 44 percent of the total U.S. output of hardwood roundwood products in 1970. Softwood products from this section made up only 6 percent of the Nation's total softwood harvest.

Trends in Forest Area

For a number of decades the area of commercial timberland in the North has been increasing as a result of widespread abandonment of crop and pasture lands and reversion to forests. A reversal of this long upward trend is anticipated, however, with a continuing decline in forest area throughout the projection period (table 50). The assumed area reductions are judged to be within the range of reasonable possibilities and are used as benchmarks in evaluating future timber supplies.

Most projected area changes have been assumed to occur in the category of farm and miscellaneous private ownerships. It is expected that urbanization, for example, especially along the Mid-Atlantic corridor, will continue to engulf extensive forested areas. Many areas adjoining lakes throughout the North and areas in the Appalachians are likewise expected to contribute very little to the timber supply.

Timber Removals and Net Growth

During the 1952–70 period both softwood and hardwood timber removals from growing stock

TABLE 47.—*Net growth of growing stock per acre in the South, by owner class and species group, 1952, 1962, and 1970, with projections to 2020*

[Cubic feet]

Owner class and species group	1952	1962	1970	Projections			
				1980	1990	2000	2020
National Forests:							
Softwoods	27.4	38.4	37.0	40.9	40.7	39.8	39.8
Hardwoods	11.9	16.5	17.6	18.6	18.4	18.0	18.0
Total	39.3	54.9	54.6	59.5	59.1	57.8	57.8
Other public:							
Softwoods	19.2	20.8	27.9	31.3	32.7	32.6	32.5
Hardwoods	11.5	14.1	17.6	19.5	20.2	20.1	20.2
Total	30.7	34.9	45.5	50.8	52.9	52.7	52.7
Forest industry:							
Softwoods	33.5	38.9	39.8	42.5	43.1	42.9	42.9
Hardwoods	11.1	12.6	13.3	14.2	14.7	14.7	14.7
Total	44.6	51.5	53.1	56.7	57.8	57.6	57.6
Farm and miscellaneous private:							
Softwoods	14.7	17.6	24.4	26.3	26.8	26.6	26.6
Hardwoods	15.2	15.3	17.4	19.0	19.9	20.1	20.1
Total	29.9	32.9	41.8	45.3	46.7	46.7	46.7
All owners:							
Softwoods	18.7	22.4	28.0	30.4	30.9	30.8	30.9
Hardwoods	14.2	14.9	16.7	18.1	18.8	18.9	18.9
Total	32.9	37.3	44.7	48.4	49.7	49.7	49.8

in the North averaged less than half the annual net growth (table 51 and fig. 30). Moreover, the margin of growth over removals increased during this period as a result of rapid increases in net growth. In 1970, growth of hardwoods was 2.3 times removals, and growth of softwoods was 2.2 times greater than removals.

Net growth and removals of growing stock in the North

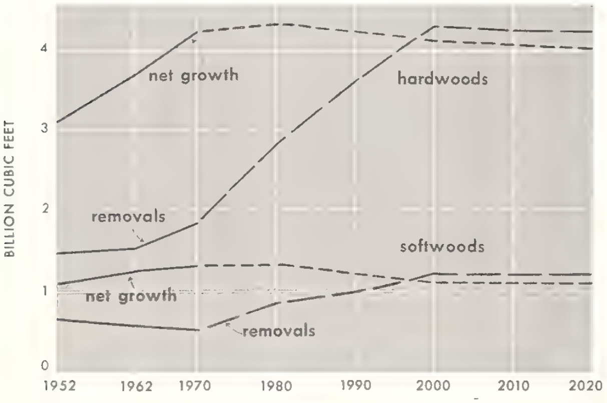

Figure 30

Rapid increases in net growth of sawtimber has similarly led to a substantial surplus of growth over removals of larger sizes of timber in recent years. Net growth of softwood sawtimber in 1970 was 1.7 times annual removals (table 52 and fig. 31). Net growth of hardwood sawtimber was 1.5 times more than removals.

The substantial excess of net growth over removals in recent years represented a recovery of northern timber resources from an extremely low level of productivity, especially in terms of the sizes and quality of timber needed by forest industries. Past logging and repeated fires left vast areas poorly stocked, but with improved fire protection most forest areas are again growing timber. Also, large areas of former agricultural land which reverted to forest after abandonment are now contributing considerable "ingrowth" as trees pass 5.0 inches in diameter. In some areas ingrowth made up at least half of the total net annual growth in 1970.

On public lands, net growth averaged about four times greater than timber removals in 1970 (Append. I, tables 21 and 22). This largely reflects

TABLE 48.—*Net growth rates of growing stock in the South, by owner class and species group, 1952, 1962, and 1970, with projections to 2020*

[Percent of inventory]

Owner class and species group	1952	1962	1970	Projections			
				1980	1990	2000	2020
National Forests:							
Softwoods	5.9	6.2	5.8	4.6	3.9	3.6	3.6
Hardwoods	3.3	3.6	3.6	3.0	2.7	2.5	2.5
Total	4.8	5.1	4.8	4.0	3.4	3.2	3.2
Other public:							
Softwoods	5.9	5.6	5.8	5.2	4.8	4.5	4.6
Hardwoods	3.9	3.9	4.0	3.8	3.6	3.5	3.5
Total	5.0	4.7	4.9	4.6	4.3	4.1	4.1
Forest industry:							
Softwoods	6.8	6.7	6.8	6.3	5.8	5.6	5.6
Hardwoods	3.4	3.5	3.7	3.8	3.7	3.7	3.7
Total	5.4	5.5	5.7	5.4	5.1	5.0	5.0
Farm and miscellaneous private:							
Softwoods	6.5	6.9	7.2	6.9	6.6	6.4	6.4
Hardwoods	3.7	3.9	4.0	4.1	4.1	4.1	4.1
Total	4.7	5.0	5.4	5.4	5.3	5.2	5.2
All owners:							
Softwoods	6.5	6.7	6.9	6.4	6.0	5.8	5.8
Hardwoods	3.6	3.8	4.0	4.0	3.9	3.9	3.9
Total	4.8	5.1	5.4	5.2	5.0	4.9	4.9

Net growth and removals of sawtimber in the North

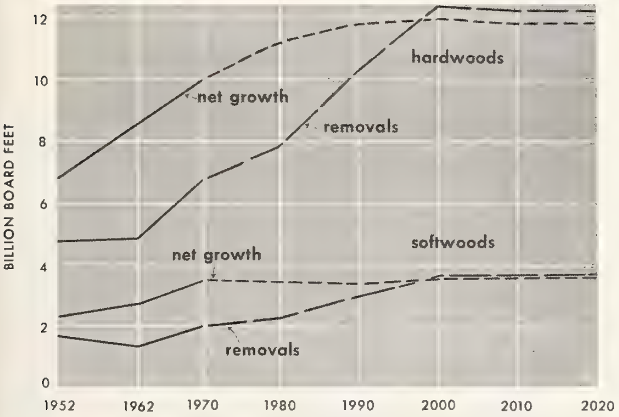

Figure 31

age classes on those areas and a policy of building up timber inventories to emphasize sawtimber harvests under relatively long rotations.

The heaviest cutting in relation to net growth has been on private lands. But on both forest industry and farm and miscellaneous holdings, removals of softwoods and hardwoods in 1970 amounted to about half the net annual growth.

Under the area and harvesting assumptions used in developing these particular projections, that is, with projected removals rising to equal net growth by the year 2000, net growth of softwood growing stock is estimated to decrease about 18 percent from the 1970 level, whereas available removals of softwoods are projected to rise by 88 percent.

Hardwood net growth in cubic feet is projected to increase somewhat then decline slightly by the year 2000 with rising stand density. Total removals, however, are projected to increase some 140 percent under the assumptions of these base projections. After 2000 growth and removals drop slightly because of the assumed drop in commercial timberland areas.

A breakdown of the data for growth and removals reveals significant differences by tree size class and quality. Growth takes place over the entire timber inventory, whereas removals are more heavily concentrated on selected species, such as maple, birch, walnut, or white oak, for

TABLE 49.—*Inventories of growing stock per acre in the South, by owner class and species group, 1952, 1962, and 1970, with projections to 2020*

[Cubic feet]

Owner class and species group	1952	1962	1970	Projections			
				1980	1990	2000	2020
National Forests:							
Softwoods	466	623	643	885	1,038	1,092	1,092
Hardwoods	361	459	486	610	686	712	712
Total	827	1,081	1,129	1,495	1,724	1,804	1,804
Other public:							
Softwoods	324	374	482	605	687	716	713
Hardwoods	296	364	439	510	556	573	575
Total	620	738	921	1,115	1,243	1,289	1,288
Forest industry:							
Softwoods	494	576	584	679	741	762	761
Hardwoods	326	359	356	378	392	397	397
Total	820	936	940	1,057	1,133	1,159	1,158
Farm and miscellaneous private:							
Softwoods	226	256	341	382	408	417	417
Hardwoods	415	395	432	460	479	486	487
Total	641	651	773	842	887	904	904
All owners:							
Softwoods	287	334	407	473	517	533	536
Hardwoods	393	392	421	455	476	484	483
Total	680	726	829	928	993	1,017	1,019

Note: May not add to totals because of rounding.

TABLE 50.—*Area of commercial timberland in the North, by owner class, 1952, 1962, and 1970, with projections to 2020*

[Million acres]

Owner class	1952	1962	1970	Projections			
				1980	1990	2000	2020
National Forests	10.3	10.3	10.5	10.4	10.3	10.1	9.9
Other public	22.0	21.5	21.5	21.2	21.0	20.8	20.4
Forest industry	14.0	14.2	17.6	18.2	18.8	19.5	20.7
Farm and miscellaneous private	123.8	129.1	128.4	126.5	124.6	122.7	118.8
Total	170.2	175.1	177.9	176.3	174.7	173.1	169.8

example. Cutting also tends to be concentrated in the better quality stands and more accessible areas. Supplies of saw logs and veneer logs thus may be short in many areas, whereas supplies of hardwood pulpwood are more than adequate for industry's needs.

Changes in timber harvesting practices and development of markets for timber that is currently unmerchantable will, therefore, be necessary to achieve the trend in available removals shown by these projections.

Supplies of Roundwood Products

In 1970, only 80 percent of the total softwood removals in the North, and 69 percent of all hardwood removals, consisted of roundwood

TABLE 51.—*Timber removals, net growth, mortality, supplies of roundwood products, and inventories in the North, 1952, 1962, and 1970, with projections (1970 level of management)* [1] *to 2020*

[Million cubic feet]

Item	1952	1962	1970	Projections			
				1980	1990	2000	2020
SOFTWOODS							
Removals from growing stock:							
Roundwood products	524	449	506	730	869	1, 036	1, 040
Logging residues	67	55	61	77	84	94	90
Other removals	50	50	62	49	52	53	53
Total	641	554	629	856	1, 005	1, 183	1, 183
Net growth	1, 074	1, 243	1, 387	1, 322	1, 194	1, 134	1, 134
Mortality	228	301	360	422	455	467	465
Roundwood supplies:							
From growing stock	524	449	506	730	869	1, 036	1, 040
From other sources [2]	79	64	73	73	73	73	73
Total	603	513	579	803	942	1, 109	1, 113
Inventory of growing stock	27, 777	34, 020	39, 114	45, 869	49, 579	50, 851	50, 893
HARDWOODS							
Removals from growing stock:							
Roundwood products	1, 057	1, 069	1, 242	2, 261	2, 998	3, 678	3, 632
Logging residues	195	193	222	306	375	442	394
Other removals	200	242	342	188	204	209	209
Total	1, 452	1, 505	1, 806	2, 755	3, 577	4, 329	4, 235
Net growth	3, 046	3, 634	4, 153	4, 253	4, 199	4, 130	4, 036
Mortality	570	732	897	1, 045	1, 123	1, 149	1, 127
Roundwood supplies:							
From growing stock	1, 057	1, 069	1, 242	2, 261	2, 998	3, 678	3, 632
From other sources [2]	322	230	167	167	167	167	167
Total	1, 379	1, 299	1, 409	2, 428	3, 165	3, 845	3, 799
Inventory of growing stock	82, 178	101, 178	116, 563	136, 414	147, 555	150, 322	147, 238

[1] Plus other area and harvesting assumptions specified in this chapter.

[2] Includes roundwood products from rough and rotten trees, limbs, dead trees, and trees on noncommercial and nonforest land.

Note: Estimates are for trend levels and consequently may differ from actual figures for the specified years.

products (table 53). Some 10 percent of the softwood removals and 12 percent of the hardwood removals were left in the woods as logging residues—about the same proportion of economically unusable material as in earlier years. Other removals, including timber losses to urban and industrial development, strip mining, highways, etc., are estimated to have amounted to somewhat more than volumes of logging residues.

Residues and other removals are expected to decrease over the projection period because of better utilization of available material. Estimated proportions of removals used for products increase, therefore, in future decades to 88 percent of all removals for softwoods and 86 percent for hardwoods.

Under the assumptions of these base projections, prospectively available supplies of softwood roundwood nearly double, from 0.6 billion cubic feet in 1970 to 1.1 billion cubic feet by 2000 (table 51). Projections for hardwoods increase nearly threefold, from 1.4 billion cubic feet to about 3.8 billion cubic feet. Somewhat smaller increases are projected for sawtimber products (table 52).

Roundwood supplies by owner class.—As in the case of forest areas, farm and miscellaneous private ownerships represent by far the major source of roundwood in the North (tables 54 and 55, and

TABLE 52.—*Sawtimber removals, net growth, mortality, supplies of roundwood products, and inventories in the North, 1952, 1962, and 1970, with projections (1970 level of management)* [1] *to 2020*

[Million board feet]

Item	1952	1962	1970	Projections			
				1980	1990	2000	2020
SOFTWOODS							
Removals from sawtimber:							
Roundwood products	1, 669	1, 322	1, 856	2, 132	2, 756	3, 535	3, 535
Logging residues	62	48	65	64	74	89	78
Other removals	134	128	181	112	122	125	126
Total	1, 865	1, 498	2, 102	2, 308	2, 952	3, 749	3, 739
Net growth	2, 383	2, 807	3, 594	3, 509	3, 521	3, 615	3, 603
Mortality	380	503	661	775	852	882	883
Roundwood supplies:							
From sawtimber	1, 669	1, 322	1, 856	2, 132	2, 756	3, 535	3, 535
From other sources [2]	229	166	258	258	258	258	258
Total	1, 898	1, 488	2, 115	2, 390	3, 014	3, 793	3, 793
Inventory of sawtimber	58, 939	69, 203	80, 061	96, 897	106, 472	110, 103	109, 887
HARDWOODS							
Removals from sawtimber:							
Roundwood products	3, 913	4, 014	5, 497	7, 062	9, 411	11, 553	11, 408
Logging residues	390	365	448	408	447	473	379
Other removals	530	575	903	416	455	468	470
Total	4, 833	4, 954	6, 848	7, 886	10, 313	12, 494	12, 257
Net growth	6, 977	8, 645	10, 076	11, 337	11, 835	12, 006	11, 767
Mortality	1, 141	1, 362	1, 669	1, 949	2, 136	2, 209	2, 173
Roundwood supplies:							
From sawtimber	3, 913	4, 014	5, 497	7, 062	9, 411	11, 553	11, 408
From other sources [2]	387	415	586	586	586	586	586
Total	4, 300	4, 430	6, 083	7, 648	9, 997	12, 139	11, 994
Inventory of sawtimber	187, 365	221, 484	251, 807	295, 876	323, 425	331, 211	325, 152

[1] Plus other area and harvesting assumptions specified in this chapter.

[2] Includes roundwood products from trees too small to qualify as sawtimber, rough and rotten trees, dead trees, and from trees on noncommercial and nonforest land.

Note: Estimates are for trend levels and consequently may differ from actual figures for the specified years.

figures 32 and 33). In 1970 these holdings supplied 73 percent of all roundwood products, while forest industry lands supplied 16 percent, and public lands 11 percent.

Roundwood production per acre.—Output of timber products per acre of commercial timberland in 1970 ranged from about 7 cubic feet on public lands other than National Forests, to 18 cubic feet on forest industry lands. Under the assumptions of this section, available harvests are projected to increase from an average cut of 11.2 cubic feet per acre in 1970 to about 29 cubic feet by 2000 (table 56).

Trends in Net Growth Per Acre

Average net growth per acre has risen 29 percent since 1952 to an average of about 31 cubic feet per acre (table 57). With the level of management and other conditions assumed in this section, average net growth of growing stock for all owners combined is expected to remain fairly constant at about 31 cubic feet per acre. Some additional growth would also occur on rough and rotten trees.

On public and industry lands some decrease in net growth is projected as a result of industry

TABLE 53.—*Components of growing stock removals in the North, 1952, 1962, and 1970, with projections to 2020*

[Percent]

Component	1952	1962	1970	Projections			
				1980	1990	2000	2020
SOFTWOODS							
Roundwood products	82	81	80	85	87	88	88
Logging residue	10	10	10	9	8	8	8
Other removals	8	9	10	6	5	4	4
Total removals	100	100	100	100	100	100	100
HARDWOODS							
Roundwood products	73	71	69	82	84	85	86
Logging residue	13	13	12	11	10	10	9
Other removals	14	16	19	7	6	5	5
Total removals	100	100	100	100	100	100	100

TABLE 54.—*Supplies of roundwood products in the North, by owner class and species group, 1952, 1962, and 1970, with projections to 2020*

[Million cubic feet]

Owner class and species group	1952	1962	1970	Projections			
				1980	1990	2000	2020
National Forests:							
Softwoods	22	26	30	57	81	104	102
Hardwoods	34	44	45	98	126	160	158
Total	56	70	75	155	207	264	260
Other public:							
Softwoods	39	41	50	92	130	168	165
Hardwoods	72	87	94	227	318	411	406
Total	111	128	144	319	448	579	571
Forest industry:							
Softwoods	138	123	168	213	260	324	344
Hardwoods	132	118	148	187	228	278	296
Total	270	241	316	400	488	602	640
Farm and miscellaneous private:							
Softwoods	404	324	332	441	471	514	502
Hardwoods	1, 140	1, 048	1, 122	1, 917	2, 493	2, 996	2, 939
Total	1, 545	1, 372	1, 454	2, 358	2, 964	3, 510	3, 441
Total North:							
Softwoods	603	513	579	803	942	1, 109	1, 113
Hardwoods	1, 379	1, 299	1, 410	2, 428	3, 165	3, 845	3, 799
Total	1, 982	1, 812	1, 989	3, 231	4, 107	4, 954	4, 912

TABLE 55.—*Supplies of sawtimber products in the North, by owner class and species group, 1952, 1962, and 1970, with projections to 2020*

[Million board feet]

Owner class and species group	1952	1962	1970	Projections			
				1980	1990	2000	2020
National Forests:							
Softwoods	82	99	118	169	275	393	387
Hardwoods	104	162	186	259	386	529	521
Total	186	261	304	428	661	922	908
Other public:							
Softwoods	99	103	170	293	468	659	649
Hardwoods	154	218	302	598	933	1, 286	1, 265
Total	252	321	472	891	1, 401	1, 945	1, 914
Forest industry:							
Softwoods	428	344	611	567	743	965	1, 023
Hardwoods	329	337	530	595	748	924	980
Total	757	681	1, 141	1, 162	1, 491	1, 889	2, 003
Farm and miscellaneous private:							
Softwoods	1, 289	942	1, 216	1, 361	1, 529	1, 776	1, 734
Hardwoods	3, 713	3, 713	5, 064	6, 196	7, 929	9, 400	9, 228
Total	5, 002	4, 655	6, 280	7, 557	9, 458	11, 176	10, 962
Total North:							
Softwoods	1, 898	1, 488	2, 115	2, 390	3, 014	3, 793	3, 793
Hardwoods	4, 300	4, 430	6, 082	7, 648	9, 997	12, 139	11, 994
Total	6, 198	5, 918	8, 197	10, 038	13, 011	15, 932	15, 787

Supplies of hardwood sawtimber products in the North, by owner class

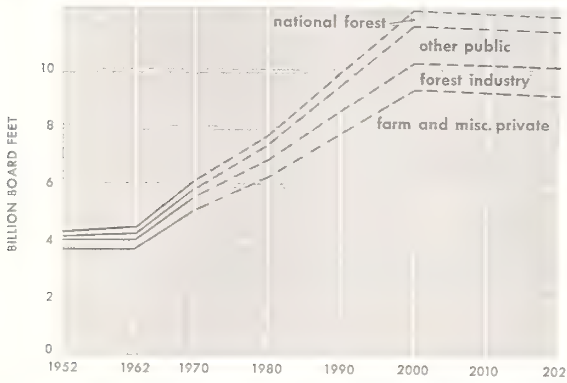

Figure 32

Supplies of softwood sawtimber products in the North, by owner class

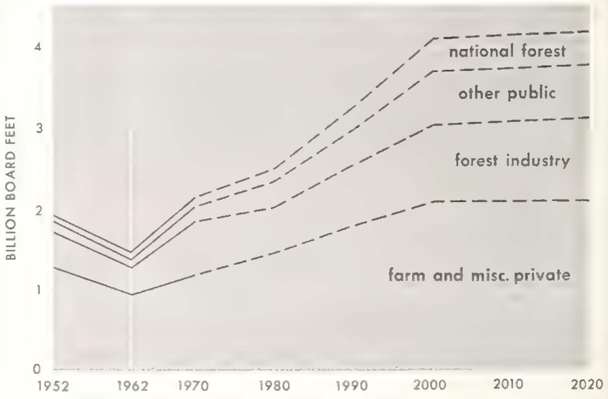

Figure 33

buildup and resulting constraints on net growth. On farm and miscellaneous private holdings, growth per acre is expected to increase somewhat with prospective improvements in stocking on these lands.

Projected net growth of timber by 2000, under the assumptions of this chapter, would still be less than half of the potential net growth that could be attained ultimately in natural stands fully stocked

TABLE 56.—*Supplies of roundwood products per acre in the North, by owner class and species group, 1952, 1962, and 1970, with projections to 2020*

[Cubic feet]

Owner class and species group	1952	1962	1970	Projections			
				1980	1990	2000	2020
National Forests:							
Softwoods	2. 1	2. 5	2. 8	5. 5	7. 9	10. 3	10. 3
Hardwoods	3. 3	4. 3	4. 4	9. 4	12. 2	15. 8	16. 0
Total	5. 4	6. 8	7. 2	14. 9	20. 1	26. 1	26. 3
Other public:							
Softwoods	1. 8	1. 9	2. 3	4. 3	6. 2	8. 0	8. 1
Hardwoods	3. 3	4. 1	4. 4	10. 7	15. 1	19. 8	19. 9
Total	5. 1	6. 0	6. 7	15. 0	21. 3	27. 8	28. 0
Forest industry:							
Softwoods	9. 8	8. 7	9. 6	11. 7	13. 8	16. 6	16. 6
Hardwoods	9. 4	8. 3	8. 4	10. 3	12. 1	14. 3	14. 3
Total	19. 2	17. 0	18. 0	22. 0	25. 9	30. 9	30. 9
Farm and miscellaneous private:							
Softwoods	3. 3	2. 5	2. 6	3. 5	3. 8	4. 2	4. 2
Hardwoods	9. 2	8. 1	8. 7	15. 1	20. 0	24. 4	24. 8
Total	12. 5	10. 6	11. 3	18. 6	23. 8	28. 6	29. 0
All owners:							
Softwoods	3. 5	2. 9	3. 3	4. 5	5. 4	6. 4	6. 5
Hardwoods	8. 1	7. 4	7. 9	13. 8	18. 1	22. 2	22. 4
Total	11. 6	10. 3	11. 2	18. 3	23. 5	28. 6	28. 9

with growing-stock trees. This mainly reflects reductions in radial growth and increases in mortality resulting from increased stocking in younger stands, and the occupancy of much forest land by rough and rotten trees or nontimber cover.

Net annual growth rates as a percent of the growing stock inventory averaged about 3.6 percent in 1970. A moderate drop to an average of 2.6 percent by 2000 is estimated under the assumptions of this section, largely to the projected buildup of both softwood and hardwood inventories.

Many of the differences in growth and in stand conditions among ownership classes are the result of differences in forest types and levels of management. Thus larger inventories per acre and higher levels of growth on National Forests and forest industry lands reflect in part higher proportions of the more productive types such as maple-birch-beech and spruce-fir. Farm and miscellaneous private lands, on the other hand, include relatively large proportions of the oak-hickory type which generally occupies the drier and less productive uplands.

Proportions of stand-size classes in 1970 also differed considerably by ownership. On public lands poletimber stands predominated, whereas sawtimber stands were more important on forest industry lands.

Trends in Timber Inventories

Because of the substantial surplus of net growth over removals in recent years, volumes of growing stock in the North increased about 42 percent between 1952 and 1970 to an average of 875 cubic feet per acre (table 58). Forest industry lands and National Forests supported the heaviest inventory volumes per acre in 1970, and such differentials are projected to continue. For all owners combined, the average inventory per acre under the assumptions of this chapter is projected to increase a further 33 percent by 2020.

PROJECTIONS OF TIMBER SUPPLIES IN THE ROCKY MOUNTAINS

The Rocky Mountain section contained 14.2 percent of the Nation's timber inventory in 1970, and accounted for 7.1 percent of the total national output of roundwood products. Some 4 percent of the Nation's lumber and wood products establishments were located in this area in 1967; these

TABLE 57.—*Net growth of growing stock per acre in the North, by owner class and species group, 1952, 1962, and 1970, with projections to 2020*

[Cubic feet]

Owner class and species group	1952	1962	1970	Projections			
				1980	1990	2000	2020
National Forests:							
Softwoods	9. 2	10. 2	11. 1	10. 9	10. 7	10. 3	10. 3
Hardwoods	19. 1	24. 9	27. 3	21. 8	18. 0	16. 9	17. 0
Total	28. 3	35. 1	38. 4	32. 7	28. 7	27. 2	27. 3
Other public:							
Softwoods	7. 3	7. 0	8. 1	8. 4	8. 4	8. 2	8. 2
Hardwoods	17. 6	19. 0	25. 3	24. 5	22. 4	21. 1	21. 1
Total	24. 9	26. 0	33. 4	32. 9	30. 8	29. 3	29. 3
Forest industry:							
Softwoods	16. 4	20. 1	22. 4	20. 1	18. 3	17. 7	17. 7
Hardwoods	16. 8	19. 4	18. 1	17. 3	16. 4	15. 9	15. 9
Total	33. 2	39. 5	40. 5	37. 4	34. 7	33. 6	33. 6
Farm and miscellaneous private:							
Softwoods	4. 7	5. 4	5. 5	5. 3	4. 5	4. 2	4. 2
Hardwoods	18. 0	20. 9	23. 4	25. 2	26. 0	26. 2	26. 2
Total	22. 7	26. 3	28. 9	30. 5	30. 5	30. 4	30. 4
All owners:							
Softwoods	6. 3	7. 1	7. 8	7. 5	6. 8	6. 5	6. 7
Hardwoods	17. 9	20. 8	23. 3	24. 1	24. 1	23. 9	23. 7
Total	24. 2	27. 9	31. 1	31. 6	30. 9	30. 4	30. 4

produced 6 percent of the value added in U.S. production of lumber and wood products.

Trends in Forest Area

Classification of forest lands in terms of commercial timberland is particularly difficult in this section because of the marginal nature of much of the forest land and timber resource and the increasing importance of nontimber and environmental management objectives that limit or preclude commercial timber production.

Forest areas in the Rocky Mountains that were classed as suitable and available for timber production in 1970 amounted to 61.6 million acres, or 3 million acres less than comparable figures in 1962 (table 59). About 0.7 million acres of National Forest land were withdrawn between 1962 and 1970 for additions to wilderness, and about 2.3 million acreas were placed in a "deferred" category pending further study of use potentials.

A further 5 percent decline in National Forest commercial timberland over the next several decades was assumed in developing projections of possible future supplies of timber. As pointed out earlier, it is of course possible that land-use and classification studies currently underway could lead to additional reductions in these area figures.

For other public owners a similar decline in commercial timberland has been projected. The small area under forest industry ownership, 2.2 million acres, was assumed to remain constant.

Commercial timberland in farm and miscellaneous ownerships remained almost constant in recent years at about 12.5 million acres. However, availability of these lands for commercial timber use is believed to have diminished because of growing use for nontimber purposes. Much of this forest acreage is of low productivity for timber production and much is held by owners whose management goals conflict with timber management. The acreage of farm and miscellaneous owners available for commercial timber use has therefore been projected to decline 25 percent below the figures shown for 1970.

The total acreage of commercial timberland in the Rocky Mountains is therefore projected to decline about 9 percent by 2020 to a level of 56 million acres. This figure includes 5 million acres with marginal possibilities for timber production, as noted in the footnote of table 59.

TABLE 58.—*Inventory of growing stock per acre in the North, by owner class, 1952, 1962, and 1970, with projections to 2020*

[Cubic feet]

Owner class and species group	1952	1962	1970	Projections			
				1980	1990	2000	2020
National Forests:							
Softwoods	189	258	296	363	403	417	417
Hardwoods	447	598	704	871	950	974	974
Total	636	856	1,000	1,234	1,353	1,391	1,391
Other public:							
Softwoods	150	193	226	274	305	316	316
Hardwoods	402	545	648	814	906	936	936
Total	552	738	874	1,088	1,211	1,252	1,252
Forest industry:							
Softwoods	440	544	640	749	805	823	824
Hardwoods	494	590	571	643	686	701	701
Total	934	1,134	1,211	1,392	1,491	1,524	1,525
Farm and miscellaneous private:							
Softwoods	132	151	155	179	192	196	196
Hardwoods	499	580	664	778	850	875	875
Total	631	731	819	957	1,042	1,071	1,071
All owners:							
Softwoods	163	194	220	260	284	294	300
Hardwoods	483	578	655	774	845	869	867
Total	646	772	875	1,034	1,129	1,163	1,167

TABLE 59.—*Area of commercial timberland in the Rocky Mountains, by owner class, 1952, 1962, and 1970, with projections to 2020*

[Millions acres]

Owner class	1952	1962	1970	Projections			
				1980	1990	2000	2020
National Forest	41.9	42.7	[1] 39.8	39.4	39.0	38.6	37.8
Other public	7.2	7.2	7.2	7.1	7.0	7.0	6.8
Forest industry	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Farm and miscellaneous private	12.5	12.5	12.4	11.8	11.1	10.5	9.2
Total	63.9	64.6	61.6	60.5	59.3	58.3	56.0

[1] Includes 5 million acres of National Forest land not considered in projecting timber supplies. These include small patches and stringers of productive forest land isolated from markets, areas too unstable to harvest with current technology, and lands where nontimber uses predominate.

Timber Removals

Because of accessibility problems and low stumpage values, timber harvests in the Rocky Mountain area for many years were limited to large, high-quality timber such as white pine and ponderosa pine. A large portion of the timber inventory was not economically available until after World War II, when improved transportation in the region and growing timber markets led to increased values for diverse species and smaller sized trees.

The extent of recent timber development is indicated by the substantial rise in timber re-

TABLE 60.—*Timber removals, net growth, mortality, supplies of roundwood products, and inventories in the Rocky Mountains, 1952, 1962, and 1970, with projections (1970 level of management)* [1] *to 2020*

[Million cubic feet]

Item	1952	1962	1970	Projections			
				1980	1990	2000	2020
SOFTWOODS							
Removals from growing stock:							
Roundwood products	466	646	815	1, 008	1, 104	1, 241	1, 197
Logging residues	57	79	103	99	92	89	67
Other removals	10	13	16	160	171	177	181
Total	533	738	934	1, 267	1, 367	1, 507	1, 445
Net growth	1, 096	1, 245	1, 289	1, 404	1, 476	1, 492	1, 520
Mortality	567	600	564	587	595	601	604
Roundwood supplies:							
From growing stock	466	646	815	1, 008	1, 104	1, 241	1, 197
From other sources [2]	29	38	38	36	35	34	34
Total	495	684	853	1, 044	1, 139	1, 275	1, 231
Inventory of growing stock	85, 043	91, 265	87, 712	89, 244	90, 396	91, 179	91, 745
HARDWOODS							
Removals from growing stock:							
Roundwood products	3	3	3	33	52	76	77
Logging residues	(3)	(3)	(3)	2	3	4	4
Other removals	(3)	(3)	(3)	14	16	17	16
Total	3	3	3	49	71	97	97
Net growth	57	66	72	90	95	94	96
Mortality	35	39	49	36	38	39	39
Roundwood supplies:							
From growing stock	3	3	3	33	52	76	77
From other sources [2]	8	11	8	13	13	12	12
Total	11	14	11	46	65	88	89
Inventory of growing stock	3, 960	4, 487	4, 507	5, 043	5, 359	5, 495	5, 438

[1] Plus other area and harvesting assumptions specified in this chapter.

[2] Includes roundwood products from rough and rotten trees, dead trees, and trees on noncommercial and nonforest land.

[3] Less than 0.5 million cubic feet.

Note: Estimates are for trend levels and consequently may differ from actual figures for the specified years.

movals between 1952 and 1970 (tables 60 and 61 and figs. 34 and 35). Acceptance of smaller tree sizes for roundwood products also is evidenced by a 75 percent increase in removals of trees 5.0 inches and larger, compared with a 68 percent increase for removals of sawtimber, that is, the saw-log portion of sound trees 9.0 inches and larger. Some of this expanded harvesting reflects cutting for pulpwood. Some is the result of using modern equipment for production of lumber from small timber.

Hardwoods play a very minor role in the Rocky Mountains. In 1970 they comprised 4.9 percent of the inventory and 0.3 percent of total removals (table 60). Only 4 percent of the net growth of hardwoods was removed in 1970.

Under the assumptions concerning trends in commercial timberland areas and continuance of forest management at 1970 levels, available removals in this base projection have been estimated to increase substantially in cubic feet, and to rise moderately for sawtimber.

These projections indicate the possibility of a 61 percent increase by 2000 in softwood growing stock removals above actual removals in 1970, and a 22 percent increase in sawtimber removals. More than half of the projected increase in removals occurs before 1980, based on the assump-

TABLE 61.—*Sawtimber removals, net growth, mortality, supplies of roundwood products, and inventories in the Rocky Mountains, 1952, 1962, 1970, with projections (1970 level of management)* [1] *to 2020*

[Million board feet]

Item	1952	1962	1970	Projections			
				1980	1990	2000	2020
SOFTWOODS							
Removals from sawtimber:							
Roundwood products	2, 940	3, 961	4, 948	5, 274	5, 349	5, 625	5, 222
Logging residues	177	240	311	275	261	259	237
Other removals	60	78	97	605	633	647	660
Total	3, 177	4, 279	5, 356	6, 154	6, 243	6, 531	6, 119
Net growth	4, 153	4, 523	4, 936	5, 646	6, 034	6, 178	6, 328
Mortality	2, 470	2, 517	2, 546	2, 214	2, 185	2, 168	2, 150
Roundwood supplies:							
From sawtimber	2, 940	3, 961	4, 948	5, 274	5, 349	5, 625	5, 222
From other sources [2]	186	228	326	311	300	289	289
Total	3, 126	4, 189	5, 274	5, 585	5, 649	5, 914	5, 511
Inventory of sawtimber	369, 173	381, 344	355, 107	345, 984	342, 424	340, 949	339, 635
HARDWOODS							
Removals from sawtimber:							
Roundwood products	14	18	11	106	146	194	189
Logging residues	1	1	1	4	5	6	6
Other removals	1	1	1	28	30	32	32
Total	16	20	13	138	181	232	227
Net growth	98	107	145	187	209	212	210
Mortality	71	73	102	63	63	68	63
Roundwood supplies:							
From sawtimber	14	18	11	106	146	194	189
From other sources [2]	1	1	2	2	2	2	2
Total	15	19	13	108	148	196	191
Inventory of sawtimber	8, 904	9, 580	9, 302	9, 955	10, 310	10, 386	9, 970

[1] Plus other area and harvesting assumptions specified in this chapter.

[2] Includes roundwood products from rough and rotten trees, dead trees, and trees on noncommercial and nonforest land.

Note: Estimates are for trend levels and consequently may differ from actual figures for the specified years.

tion that National Forest removals could rise to equal the level of allowable cut estimated in 1970.

It is recognized that forest acreages could vary from assumptions as a result of changing land management objectives. Allowable cut levels could be revised downward as a result of increases in nontimber uses. And economic analyses indicate that actual timber harvests could equal allowable cuts only with significantly higher stumpage price levels than existed in 1970.

Projections also indicate that substantial volumes of hardwoods, particularly aspen, could be made available under the assumptions of these base projections, but substantial changes in hardwood values, plant capacity, and markets would be necessary before expanded use becomes feasible.

Supplies of Roundwood

Harvests of timber products for use by the timber industries made up an estimated 87 percent of all softwood growing stock removals in 1970 (tables 60 and 62). Approximately 11 percent of the total volume removed from growing stock was left in the woods as logging residues. An estimated 2 percent—which probably was an underestimate of average annual withdrawals—represented re-

Net growth and removals of growing stock in the Rocky Mountains

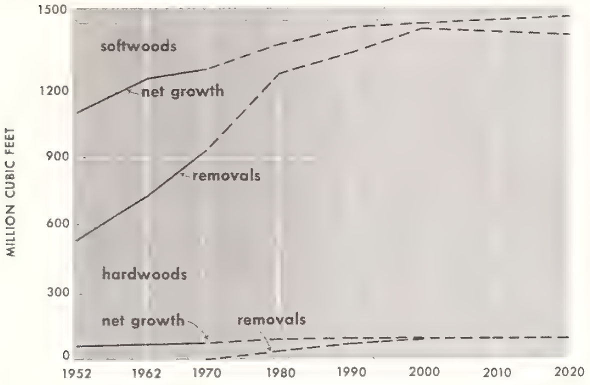

Figure 34

Net growth and removals from sawtimber in the Rocky Mountains

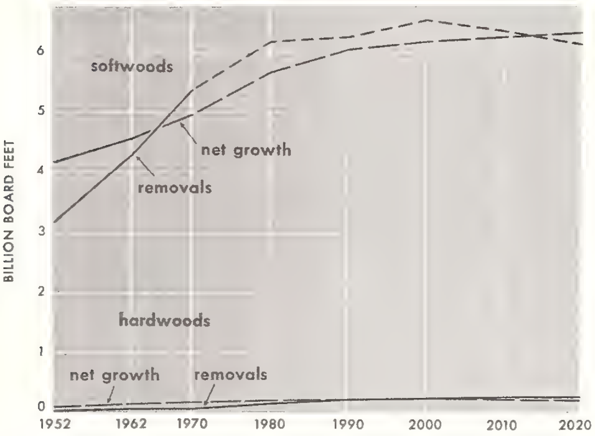

Figure 35

movals of timber volumes on lands shifted from timber to other uses.

It has been assumed in these base projections that an increasing amount of the material now left as logging residue will be utilized for products in the future. Other removals are projected at a relatively high level in accordance with earlier assumptions on area trends.

In addition to roundwood products from growing stock, some production of roundwood is obtained from rough, rotten, and dead trees and from trees on areas not classified as commercial timberland. Materials from these sources amounted to nearly 5 percent of all roundwood produced in 1970 (tables 60 and 61).

Available supplies of softwood roundwood from all sources are projected to increase about 50 percent between 1970 and 2000 to nearly 1.3 billion cubic feet (tables 60 and 63). A large projected increase in available output from National Forests mainly reflects the fact that actual timber harvests on National Forests in 1970 were about 27 percent below the estimated allowable cuts used as the basis for these supply projections.

Achievement of the full allowable cut as assumed would require higher prices than in 1970. Also, it appears that new studies of multiple-use management requirements, and new studies of areas for possible wilderness designation, will result in somewhat lower levels of allowable cut than estimated in this section. Increased management and/or utilization efforts could serve to prevent or minimize such reductions in available supplies, as indicated in the following chapter.

Sawtimber supplies.—Available output of softwood roundwood in board feet of sawtimber size material increases only moderately in these projections in contrast to the projected rise of 50 percent in available output in cubic feet (table 64 and fig. 36). Projected harvests from National Forests represent nearly 59 percent of the total projected output of sawtimber products.

Increases in sawtimber production also are projected for other public lands and for farm and

TABLE 62.—*Components of softwood growing stock removals in the Rocky Mountains, 1952, 1962, and 1970, with projections to 2020*

[Percent]

Component	1952	1962	1970	Projections			
				1980	1990	2000	2020
Roundwood products	87	87	87	80	81	82	83
Logging residue	11	11	11	8	7	6	5
Other removals	2	2	2	12	12	12	12
Total removals	100	100	100	100	100	100	100

TABLE 63.—*Supplies of roundwood products in the Rocky Mountains, by owner class and species group, 1952, 1962, and 1970, with projections to 2020*

[Million cubic feet]

Owner class and species group	1952	1962	1970	Projections			
				1980	1990	2000	2020
National Forests:							
Softwoods	218	387	519	702	697	692	685
Hardwoods	7	10	9	23	28	32	38
Total	225	397	528	725	725	724	723
Other public:							
Softwoods	72	78	78	82	120	177	174
Hardwoods	1	2	(1)	4	7	10	10
Total	74	80	78	86	127	187	184
Forest industry							
Softwoods	90	118	170	146	127	100	102
Hardwoods	(1)	1	(1)	6	6	5	5
Total	91	119	170	152	133	105	107
Farm and miscellaneous private:							
Softwoods	116	101	86	113	196	306	270
Hardwoods	2	2	1	12	24	41	36
Total	118	103	87	125	220	347	306
Total Rocky Mountains:							
Softwoods	495	684	852	1, 044	1, 139	1, 275	1, 231
Hardwoods	11	14	11	46	65	89	89
Total	506	698	863	1, 090	1, 204	1, 364	1, 320

[1] Value is less than 0.5 million cubic feet.

miscellaneous ownerships. In the latter case, the projected change in roundwood output is based on the assumption that timber harvests will increase from the actual level of 1970 to a balance with growth on lands remaining in the commercial timberland category. On these farm and miscellaneous ownerships removals in 1970 amounted to only 31 percent of the net growth of growing stock and 56 percent of sawtimber growth.

Forest industry ownerships display almost an opposite trend. As reserves of industrial timber are harvested, projected output declines to about 63 percent of the 1970 level. Projected roundwood production per acre declines from a relatively high level of about 76 cubic feet in 1970 to 49 cubic feet by 2020.

Projection alternatives.—A substantial increase in projected available supplies of roundwood products from the Rocky Mountains in the face of some decline in commercial timberland acreage and a drop in output on forest industry lands will be possible only if farm and miscellaneous private owners greatly increase removals and if harvests in National Forests actually rise to the allowable cut levels estimated in 1970.

Furthermore, most of the projected increase in available timber supplies must come from smaller diameter trees. Available roundwood supplies from growing stock trees over 5 inches in diameter is estimated to increase 53 percent over 1970 levels. Available output of sawtimber, however, is projected to increase only 8 percent above the actual cut in 1970. The preponderance of trees below 9 inches in diameter in the projections of available timber supplies indicates that improved utilization of trees by new types of milling equipment or use for pulpwood will be necessary if these supplies are to be utilized.

While these projections of potential supply indicate what is biologically available under the specified assumptions, the Rocky Mountain area is faced with problems of economic inaccessibility of much timber, lack of markets for small wood, and possible increases in management constraints to protect environmental values. Consequently, estimates of timber supplies economically available with alternative price levels have been developed, as shown in the final section of this chapter.

TABLE 64.—*Supplies of sawtimber products in the Rocky Mountains, by owner class and species group, 1952, 1962, and 1970, with projections to 2020*

[Million board feet]

Owner class and species group	1952	1962	1970	Projections			
				1980	1990	2000	2020
National Forests:							
Softwoods	1, 362	2, 370	3, 209	3, 884	3, 692	3, 528	3, 287
Hardwoods	10	13	11	61	74	82	88
Total	1, 372	2, 383	3, 220	3, 945	3, 766	3, 610	3, 375
Other public:							
Softwoods	451	470	490	396	537	752	733
Hardwoods	1	2	1	11	17	26	25
Total	452	472	491	407	554	778	758
Forest industry:							
Softwoods	606	760	1, 047	801	624	453	455
Hardwoods	1	1	(1)	5	4	3	3
Total	607	761	1, 047	806	628	456	458
Farm and miscellaneous private:							
Softwoods	707	589	527	504	796	1, 180	1, 037
Hardwoods	3	3	1	31	53	85	74
Total	710	592	528	535	849	1, 265	1, 111
Total Rocky Mountains:							
Softwoods	3, 126	4, 189	5, 273	5, 585	5, 648	5, 914	5, 511
Hardwoods	15	19	13	108	148	196	191
Total	3, 141	4, 208	5, 286	5, 693	5, 796	6, 110	5, 702

[1] Less than 0.5 million board feet.

Supplies of softwood sawtimber products in the Rocky Mountains, by owner class

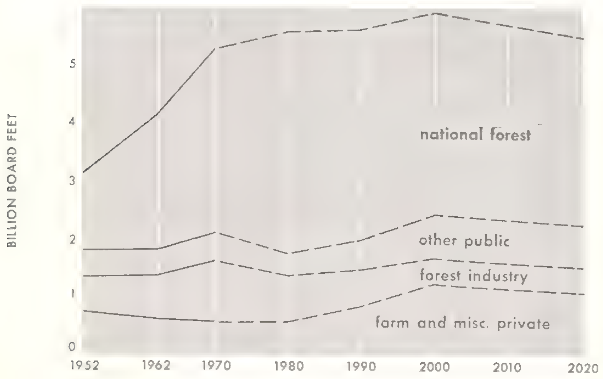

Figure 36

Net Growth and Mortality

Net growth of both growing stock and sawtimber are projected to increase somewhat under the management, cutting, and area assumptions adopted in this chapter. Projected growth of growing stock rises from 1.4 billion cubic feet in 1970 to 1.6 billion cubic feet in 2020—a rise of 19 percent (table 60 and fig. 34). Projected net growth of sawtimber rises about 29 percent (table 61 and fig. 35).

In terms of per acre figures, net growth of growing stock under the specified assumptions rises from about 24 cubic feet in 1970 to 29 cubic feet by 2020 (table 65). Net growth figures vary rather widely for different classes of ownership, depending on site quality, relative proportions of old-growth timber, and intensity of management.

A substantial part of the timber growth in the Rocky Mountains in the past has been offset by mortality, reflecting the large proportion of old-growth timber and major losses to insects such as bark beetles, diseases such as white pine blister rust, and frequent fires. In 1970, for example, estimated mortality amounted to more than 2.6 billion board feet, or more than one-third of the gross growth (tables 60 and 61). Mortality of sawtimber is expected to decline, however, with continued cutting of old-growth timber.

TABLE 65.—*Net growth and mortality of growing stock and sawtimber per acre in the Rocky Mountains, by owner class, 1952, 1962, and 1970, with projections to 2020*

GROWING STOCK—CUBIC FEET

Owner class and item	1952	1962	1970	Projections 1980	Projections 1990	Projections 2000	Projections 2020
National Forests:							
Net growth	17	19	23	21	23	24	27
Mortality	10	10	12	10	10	11	11
Other public:							
Net growth	17	20	23	27	28	28	28
Mortality	10	10	10	11	12	12	12
Forest industry:							
Net growth	35	41	47	47	48	49	49
Mortality	10	10	11	10	9	8	8
Farm and miscellaneous private:							
Net growth	18	22	25	31	35	34	34
Mortality	8	8	9	10	12	12	12
All owners:							
Net growth	18	20	24	25	26	27	29
Mortality	9	10	11	10	11	11	11

SAWTIMBER—BOARD FEET

Owner class and item	1952	1962	1970	Projections 1980	Projections 1990	Projections 2000	Projections 2020
National Forests:							
Net growth	62	66	89	87	95	101	112
Mortality	42	43	55	38	37	37	39
Other public:							
Net growth	64	72	79	100	111	110	110
Mortality	42	40	39	39	42	44	44
Forest industry:							
Net growth	168	186	201	214	207	209	209
Mortality	48	48	47	40	35	33	33
Farm and miscellaneous private:							
Net growth	64	71	77	103	119	121	121
Mortality	30	29	29	35	38	40	40
All owners:							
Net growth	67	72	90	96	105	110	117
Mortality	40	40	47	38	38	38	40

Trends in Timber Inventories

Average per acre inventories of timber increased about 17 percent on all ownerships combined in the Rocky Mountains between 1952 and 1970 (table 66). Under the management, cutting, and area assumptions specified in this section, cubic foot inventories per acre are projected to increase a further 6 percent by 2020.

Estimated sawtimber inventories per acre have increased slightly in recent years to roughly 6,400 board feet per acre. Projected inventories of this class of material drop about 3 percent by 2020.

PROJECTIONS OF TIMBER SUPPLIES IN THE PACIFIC COAST SECTION

The Pacific Coast section provided over half the softwood sawtimber products cut in 1970, and one-third of all timber products. Although proportions of the national timber harvest are expected to decline somewhat, this section represents a major part of the U.S. forest economy.

Trends in Forest Area

Recent trends indicate a continuing loss of commercial timberland in the Pacific Coast States of California, Washington, Oregon, and coastal Alaska. Thus between 1952 and 1970, commercial timberland areas decreased 1.2 million acres, or almost 2 percent (table 67).

Changes in the timber growing base have occurred as a result of expanding populations and related development of urban areas, roads and powerlines, and recreational facilities. Trends in land use are especially critical for timber production in areas such as western Washington where forest lands are highly productive for timber. Communities in this area have been expanding rapidly into areas that were formerly commercial timberland.

TABLE 66.—*Inventory volumes per acre in the Rocky Mountains, by owner class, 1952, 1962, and 1970, with projections to 2020*

GROWING STOCK—CUBIC FEET

Owner class	1952	1962	1970	Projections			
				1980	1990	2000	2020
National Forest	1,426	1,522	1,732	1,520	1,545	1,584	1,702
Other public	1,432	1,476	1,520	1,679	1,799	1,853	1,853
Forest industry	2,123	2,260	2,367	2,082	1,889	1,816	1,816
Farm and miscellaneous private	1,128	1,209	1,275	1,511	1,687	1,767	1,767
All owners	1,393	1,482	1,630	1,558	1,614	1,658	1,735

SAWTIMBER—BOARD FEET

Owner class	1952	1962	1970	1980	1990	2000	2020
National Forest	6,046	6,243	6,912	5,846	5,780	5,816	6,135
Other public	6,350	6,187	6,107	6,256	6,653	6,843	6,843
Forest industry	10,564	10,663	10,673	8,807	7,677	7,284	7,284
Farm and miscellaneous private	4,402	4,486	4,553	5,220	5,741	5,989	5,989
All owners	5,917	6,051	6,440	5,881	5,947	6,026	6,242

TABLE 67.—*Area of commercial timberland on the Pacific Coast, by owner class, 1952, 1962, and 1970, with projections to 2020*

[Million acres]

Owner class	1952	1962	1970	Projections			
				1980	1990	2000	2020
National Forest	30.5	31.3	30.9	30.7	30.4	30.1	29.5
Other public	10.4	9.2	9.0	8.8	8.7	8.6	8.5
Forest industry	11.2	11.9	12.2	12.0	11.9	11.7	11.4
Farm and miscellaneous private	16.7	16.1	15.4	14.9	14.6	14.3	14.1
Total	68.8	68.5	[1] 67.6	66.5	65.5	64.7	63.4

[1] Includes 1.1 million acres in Hawaii not considered in projecting timber supplies.

Considerable acreages of commercial timberland also have been converted to farm and pasture land in the Douglas-fir region, for example, and in the coastal area of California. Although the rate of land clearing for agricultural use appears to have diminished, many owners have preferred more immediate income-producing pursuits such as the grazing of sheep and cattle to uncertain and deferred returns from timber growing.

Road construction also has accounted for significant losses of commercial timberland on the Pacific Coast. The public highway system has been greatly extended and many existing highways have been widened. Also a major portion of public and private timberlands have been roaded with timber access roads, with consequent reduction of the commercial timberland base. Many electric and gas transmission lines also pass through commercial timberland, and numerous reservoirs have been constructed in forested areas of the Douglas-fir region and in California.

Considerable shifts in commercial timberland acreage also have occurred within the four ownership groups considered. In eastern Oregon, a substantial increase in commercial timberland in National Forests was due to the 1960 transfer of almost one-half million acres from the Klamath Indian Reservation to the Winema National Forest. Commercial timberland in other public ownerships also decreased between 1952 and 1970 as a result of the return of tax deeded land in California to private ownerships, and sale of certain public domain and Indian trust lands.

Forest industry increased its ownership of commercial timberland during this same period, largely as a result of acquisition from other private ownerships. Farm and miscellaneous private ownership of commercial timberland has generally decreased, largely because of shifts to industrial ownership and conversion of substantial areas to nonforest uses such as urban development and pasture.

The projected changes in commercial timberland during the period 1970–2020 assume some continued losses of forest land to various nontimber uses such as indicated above. Thus, in coastal Alaska 326 thousand acres of commercial timber land was assumed to be withdrawn in the 1970's for recreational use. It is of course possible that growing needs for recreational and environmental uses of forest land will lead to further withdrawals of land from timber harvesting. Hence these projections of commercial timberland, and related projections of future timber supplies, must be considered as approximations that appear reasonable at this time.

Timber Removals

A summary of trends in removals, and their relationship to other variables such as net growth, roundwood products, and inventories, is presented in tables 68 and 69. Removals of growing stock

TABLE 68.—*Timber removals, net growth, mortality, supplies of roundwood products, and inventories in the Pacific Coast Section, 1952, 1962, and 1970, with projections (1970 level of management)* [1] *to 2020*

[Million cubic feet]

Item	1952	1962	1970	Projections			
				1980	1990	2000	2020
SOFTWOODS							
Removals from growing stock:							
Roundwood products	2, 821	2, 926	3, 469	3, 337	3, 099	3, 058	3, 200
Logging residues	568	511	496	461	417	404	409
Other removals	98	95	99	106	108	111	116
Total	3, 487	3, 532	4, 064	3, 904	3, 624	3, 573	3, 725
Net growth	1, 999	2, 328	2, 589	2, 798	3, 016	3, 211	3, 480
Mortality	1, 493	1, 434	1, 378	1, 313	1, 300	1, 314	1, 375
Roundwood supplies:							
From growing stock	2, 821	2, 926	3, 469	3, 337	3, 099	3, 058	3, 200
From other sources [2]	418	398	336	305	277	274	291
Total	3, 239	3, 324	3, 805	3, 642	3, 376	3, 332	3, 491
Inventory of growing stock	243, 077	235, 150	226, 643	210, 861	204, 072	200, 374	195, 773
HARDWOODS							
Removals from growing stock:							
Roundwood products	29	53	75	74	87	95	103
Logging residues	12	20	30	27	31	32	36
Other removals	3	5	9	28	23	20	4
Total	44	78	114	129	141	147	143
Net growth	297	383	467	384	294	229	172
Mortality	62	76	87	125	146	160	175
Roundwood supplies:							
From growing stock	29	53	75	74	87	95	103
From other sources [2]	6	9	10	8	9	10	11
Total	35	62	85	82	96	105	114
Inventory of growing stock	10, 427	12, 749	14, 822	17, 584	19, 526	20, 624	21, 530

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[1] Plus other area and harvesting assumptions specified in this chapter.

[2] Includes roundwood products from rough and rotten trees, dead trees, and trees on noncommercial and nonforest land.

Note: Estimates are for trend levels and consequently may differ from actual figures for the specified years.

TABLE 69.—*Sawtimber removals, net growth, mortality, supplies of roundwood products, and inventories in the Pacific Coast Section, 1952, 1962, and 1970, with projections (1970 level of management)* [1] *to 2020*

[Million board feet]

Item	1952	1962	1970	Projections			
				1980	1990	2000	2020
SOFTWOODS							
Removals from sawtimber:							
Roundwood products	19, 905	19, 872	22, 849	21, 100	19, 115	18, 261	17, 894
Logging residues	1, 783	1, 632	1, 532	1, 384	1, 233	1, 175	1, 159
Other removals	603	575	855	552	545	534	514
Total	22, 291	22, 079	25, 236	23, 036	20, 893	19, 970	19, 567
Net growth	9, 354	10, 656	11, 631	12, 137	12, 832	13, 632	14, 922
Mortality	8, 172	7, 559	6, 876	6, 262	5, 831	5, 535	5, 169
Roundwood supplies:							
From sawtimber	19, 905	19, 872	22, 849	21, 100	19, 115	18, 261	17, 894
From other sources [2]	2, 534	2, 668	2, 334	2, 164	2, 208	2, 386	2, 828
Total	22, 439	22, 540	25, 183	23, 264	21, 323	20, 647	20, 722
Inventory of sawtimber	1, 365, 202	1, 274, 583	1, 194, 245	1, 056, 858	973, 417	908, 460	810, 276
HARDWOODS							
Removals from sawtimber:							
Roundwood products	112	179	295	354	405	438	467
Logging residues	26	52	49	44	52	55	62
Other removals	10	18	32	88	72	59	11
Total	148	249	376	486	529	552	540
Net growth	923	1, 242	1, 510	1, 284	1, 003	800	604
Mortality	192	225	267	339	390	426	458
Roundwood supplies:							
From sawtimber	112	179	295	354	405	438	467
From other sources [2]	10	22	27	26	30	31	36
Total	122	201	322	380	435	469	503
Inventory of sawtimber	31, 307	39, 209	46, 394	54, 840	60, 885	64, 231	66, 820

[1] Plus other area and harvesting assumptions specified in this chapter.

[2] Includes roundwood products from rough and rotten trees, dead trees, and trees on noncommercial and nonforest land. Also includes saw logs from trees less than sawtimber size.

Note: Estimates are for trend levels and consequently may differ from actual figures for the specified years.

and sawtimber shown in these tables reflect both harvesting of timber and volumes withdrawn for other purposes. Timber removals on the Pacific Coast are dominated by softwoods; hardwoods account for a very small portion of the inventory and a negligible portion of removals.

Not all timber removals are available to the forest industries in the form of roundwood products such as saw logs, veneer logs, and pulpwood. In 1970 roundwood products made up only 85 percent of the softwood removals from growing stock on the Pacific Coast (table 70). Logging residues accounted for 12 percent, and other removals of softwood timber on lands transferred to other uses an estimated 3 percent of the total.

In these base projections, it was assumed that the proportion of timber harvests left as logging residue would drop to about 11 percent of removals. Other removals were assumed to remain close to the level of 1970.

In addition to output from growing stock, substantial quantities of roundwood products have been produced from dead and rough and rotten trees in old-growth stands. Decreasing amounts of small trees of less than sawtimber size as defined in 1970 also have been used as saw logs. Future

TABLE 70.—*Components of growing stock removals on the Pacific Coast, 1952, 1962, and 1970, with projections to 2020*

[Percent]

Component	1952	1962	1970	Projections			
				1980	1990	2000	2020
SOFTWOODS							
Roundwood products	81	83	85	85	85	86	86
Logging residue	16	14	12	12	12	11	11
Other removals	3	3	3	3	3	3	3
Total removals	100	100	100	100	100	100	100
HARDWOODS							
Roundwood products	66	68	66	57	61	65	72
Logging residue	27	26	26	21	22	22	25
Other removals	7	6	8	22	17	13	3
Total removals	100	100	100	100	100	100	100

output from these nongrowing stock sources is projected to decrease further from the 1970 level.

Supplies of Roundwood Products

Harvests of softwood roundwood on the Pacific Coast increased over 17 percent between 1952 and 1970 from 3.2 to 3.8 billion cubic feet (table 68). Output of softwood products in board feet increased about 12 percent from 22.4 to 25.2 billion board feet (table 69 and fig. 37).

The Pacific Coast preeminence as a major source of timber products until recently was achieved by a high level of production from forest industry and other private lands. Almost all of the recent production gains, however, were attributable to increased timber harvests on National Forests and other public ownerships, with the share of total output from these lands increasing from 23 percent in 1952 to 45 percent in 1970 (table 71). Increased production from public lands resulted both from increasing demands from the timber industry and from reappraisals of future growth and utilization potentials. The increase from public lands not only offset decreases in production from private ownerships, but also pushed regional production to an all-time peak.

Supplies of softwood sawtimber products in the Pacific Coast, by owner class

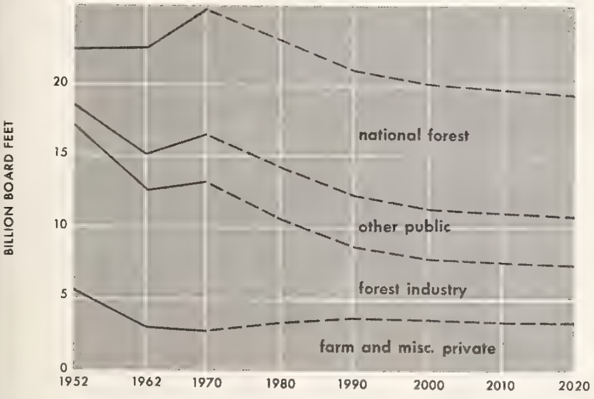

Figure 37

With public lands dedicated to a sustained level of production, and with industry faced with deficiencies in harvestable age classes in the near future, somewhat different trends are anticipated (tables 71 and 72). By the year 2000, under the assumptions of these base projections softwood roundwood output is estimated to decrease about 12 percent to 3.3 billion cubic feet, including 20.6 billion board feet of sawtimber. This drop would be largely a result of a nearly 50 percent decrease in log production on forest industry lands.

National Forests.—Projected output from National Forest lands, assuming 1970 levels of management and allowable cuts, remain at about .13 billion cubic feet over the projection period, including about 9 billion board feet of sawtimber (tables 71 and 72).

Beyond 2020, however, results of recent projections and a recent comprehensive study of National Forests in the Douglas-fir region [6] point to an ultimate falldown in available harvests unless forest management is materially accelerated. For this reason these base projections may overstate supplies actually available with 1970 levels of management.

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[6] U.S. Department of Agriculture, Forest Service. Douglas-fir supply study. 53 p. 1969.

TABLE 71.—*Supplies of roundwood products in the Pacific Coast Section, by owner class and species group, 1952, 1962, and 1970, with projections to 2020*

[Million cubic feet]

Owner class and species group	1952	1962	1970	Projections			
				1980	1990	2000	2020
National Forest:							
Softwoods	537	1,076	1,274	1,341	1,342	1,348	1,361
Hardwoods	2	4	12	13	13	13	13
Total	539	1,080	1,286	1,354	1,355	1,361	1,374
Other public:							
Softwoods	199	355	471	510	525	542	602
Hardwoods	6	4	12	8	8	8	8
Total	205	359	483	518	533	550	610
Forest industry:							
Softwoods	1,644	1,400	1,601	1,207	862	801	888
Hardwoods	19	25	36	40	51	59	68
Total	1,663	1,425	1,637	1,247	913	860	956
Farm and miscellaneous private:							
Softwoods	859	492	459	583	646	641	639
Hardwoods	8	29	25	22	24	24	26
Total	867	521	484	605	670	665	665
All owners:							
Softwoods	3,239	3,324	3,805	3,642	3,376	3,332	3,491
Hardwoods	35	62	85	82	96	105	114
Total	3,274	3,386	3,890	3,724	3,472	3,437	3,605

Other public lands.—On public lands managed by the Bureau of Land Management and Bureau of Indian Affairs, and on land in State ownership, timber harvests are also based on allowable cut calculations. Although the area in these public ownerships decreased approximately 13 percent between 1952 and 1970, removals more than doubled as a result of the growth in local demands for timber that also resulted in increasing timber cutting on National Forests. Another major factor was greater investment in forest management practices provided directly or indirectly from timber receipts. On these public ownerships, projections of roundwood timber harvests average about 3.5 billion board feet (table 72).

Forest industry.—Roundwood timber harvests on forest industry lands showed a slight downward trend in the 1952–70 period to 10.6 billion board feet. However, substantial changes occurred internally within the Pacific Coast area. Most striking was an 85 percent increase in harvests, mainly in young-growth forests, on industry lands in western Washington, in contrast to a 25 percent reduction in western Oregon and a 30 percent reduction in California. The sharp drop in timber harvests in these latter areas reflected past heavy cutting on industry lands and resulting depletion of inventory.

Over the projection period roundwood harvests from industry lands were projected to decrease sharply as a result of reduction of old-growth forests to about 4.8 billion board feet by 2000 (table 72).

Farm and miscellaneous private.—On nonindustrial private timberlands in farmer and miscellaneous private ownerships, roundwood harvests in board feet decreased one-half between 1952 and 1970, largely as a result of cutting residual old-growth stands on the remaining accessible forests in these ownerships (tables 71 and 72). In addition, approximately 8 percent of these lands were sold to industrial owners.

The reduction in harvests on farm and miscellaneous private ownerships was especially pronounced in California, with a drop of 69 percent between 1952 and 1970. On many of the cutover lands in this area, as in other parts of the Northwest, hardwoods have taken over much of the land following timber harvesting.[7] In other areas,

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[7] Oswald, Daniel D. Timber resources of Mendocino and Sonoma Counties, California. USDA Forest Service Resource Bull. PNW–40, 76 p. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon 1972.

TABLE 72.—*Supplies of sawtimber products in the Pacific Coast Section, by owner class and species group, 1952, 1962, and 1970, with projections to 2020*

[Million board feet]

Owner class and species group	1952	1962	1970	Projections			
				1980	1990	2000	2020
National Forest:							
Softwoods	3,864	7,449	8,769	9,102	9,054	9,023	8,874
Hardwoods	4	13	43	66	67	66	65
Total	3,868	7,462	8,812	9,168	9,121	9,089	8,939
Other public:							
Softwoods	1,438	2,513	3,264	3,391	3,414	3,457	3,607
Hardwoods	24	11	47	32	32	33	36
Total	1,462	2,524	3,310	3,423	3,446	3,490	3,643
Forest industry:							
Softwoods	11,464	9,496	10,432	7,475	5,229	4,563	4,726
Hardwoods	72	84	141	183	223	256	280
Total	11,536	9,580	10,573	7,658	5,452	4,819	5,006
Farm and miscellaneous private:							
Softwoods	5,674	3,082	2,719	3,295	3,626	3,604	3,515
Hardwoods	22	94	91	100	113	114	122
Total	5,696	3,176	2,810	3,395	3,739	3,718	3,637
All owners:							
Softwoods	22,439	22,540	25,182	23,264	21,323	20,647	20,722
Hardwoods	122	201	322	380	435	469	503
Total	22,561	22,741	25,504	23,644	21,758	21,116	21,225

TABLE 73.—*Supplies of roundwood products per acre in the Pacific Coast Section, by owner class, 1952, 1962, and 1970, with projections to 2020*

[Cubic feet per acre]

Owner class	1952	1962	1970	Projections			
				1980	1990	2000	2020
National Forest	17.7	34.5	41.6	44.1	44.6	45.2	46.6
Other public	19.6	39.1	53.4	65.7	69.1	72.1	81.2
Forest industry	148.3	119.5	134.0	104.5	77.8	74.4	83.7
Farm and miscellaneous private	52.1	32.3	31.3	42.2	48.1	48.5	49.4
All owners	47.6	49.4	57.5	57.4	54.4	54.5	58.3

particularly in western Washington, early cutting on the relatively accessible forest lands in these ownerships, and subsequent fire control, resulted in establishment of extensive young-growth stands capable of supporting an increasing cut in the future.

For all lands in farm and miscellaneous private ownerships, roundwood harvests were projected to rise about 37 percent by 2020 (table 71).

Harvests of hardwood products amounted to only 85 million cubic feet in 1970, or 2.2 percent of the total timber harvest. Even with a projected increase in the hardwood cut, and a decrease in softwood output, hardwoods make up only 3 percent of projected supplies of roundwood in 2000.

Roundwood production per acre.—Timber harvests per acre in recent years have varied widely by ownership (table 73). For all ownerships combined, roundwood output in 1970 averaged 57.5

cubic feet per acre of commercial timberland, but this figure varied from a low of about 31 cubic feet on farm and miscellaneous private lands and 42 cubic feet on National Forests to a high of 134 cubic feet per acre on forest industry lands.

The low cutting level on farm and miscellaneous lands in this period largely reflected low levels of inventory due to past heavy cutting. The limited harvesting of timber on public lands, despite large inventory volumes, has been a result of long rotations to achieve agency objectives, as well as lower inherent site productivity of many areas in public ownership.

Projections of available roundwood supplies per acre increase ultimately for all ownerships combined, with a narrowing of the range in harvests per acre among the different owner classes. The highest projected output is for industry-owned lands, in spite of a rapidly shrinking inventory, largely due in part to the concentration of the most productive lands in these holdings and relatively intensive management.

Net Growth in Relation to Removals

Long-run trends in future timber harvests, after the conversion of most old-growth stands, will be determined essentially by trends in growth. Although net growth has been less than harvests, growth has been rising steadily and future sizable increases are projected, particularly in terms of cubic feet (tables 68 and 69, and figs. 38 and 39).

For all owners combined, a continued excess of removals over net growth is expected for both growing stock and sawtimber over the projection period. Thereafter a prospective drop in National Forest sawtimber production—assuming 1970 management levels—would tend to bring removals and growth into balance at some reduced level.

Net growth per acre.—Net growth per acre on the Pacific Coast has trended upward over the past 20 years as more old-growth timber with low growth rates has been replaced by faster growing young trees. For all forest owners combined, net growth averaged 45 cubic feet per acre in 1970 (table 74)—about 35 percent higher than in 1952. In future decades net growth for all owners is projected to increase to an average of 59 cubic feet per acre under the assumptions of this base projection.

Net growth on National Forest lands in 1970 was much below that on other ownerships, due to the heavy inventories of old-growth timber on these public lands of generally lower sites.

Net growth rates of softwood growing stock averaged only 1.1 percent of the softwood inventory in 1970—a consequence of the predominance of old-growth timber with high volumes and high mortality rates. Net growth of softwood growing stock varied from 0.6 percent on National Forests to 2.5 percent on farm and miscellaneous private lands. Over the projection period growth rates increase on all categories of ownership except on farm and miscellaneous holdings to an estimated average of 1.8 percent by 2020 (table 75).

Net growth and removals of growing stock in the Pacific Coast

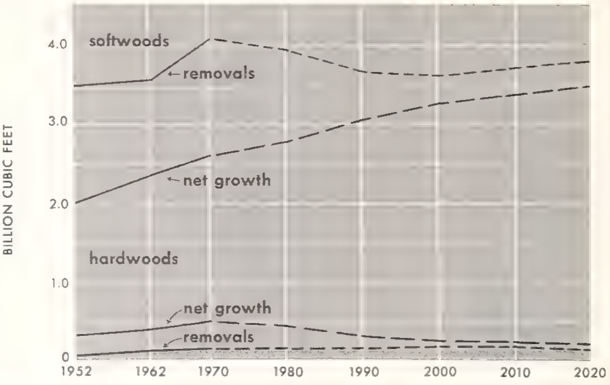

Figure 38

Net growth and removals of sawtimber in the Pacific Coast

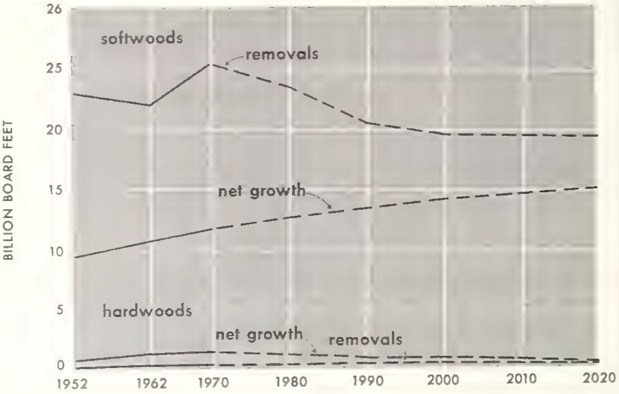

Figure 39

Mortality.—Natural losses of softwood timber on all ownerships combined averaged about 20 cubic feet per acre in 1970, or about one-third of gross growth (tables 68, 69, and 76). This relatively high level of mortality was a result of the preponderance of old-growth timber in this section, and existing levels of forest protection and management. Mortality on farm and miscellaneous ownerships was considerably below that on other lands in the 1952–70 period, one factor being the comparatively young age of stands on these nonindustrial private lands.

While the projected mortality figures for softwood sawtimber show a steady decline over the projection period (fig. 40), there are diverging trends amongst the various ownerships. Projec-

TABLE 74.—*Net growth of growing stock per acre in the Pacific Coast Section, by owner class and species group, 1952, 1962, and 1970, with projections to 2020*

[Cubic feet]

Owner class and species group	1952	1962	1970	Projections			
				1980	1990	2000	2020
National Forests:							
Softwoods	20.5	23.1	25.5	28.2	31.1	34.1	41.0
Hardwoods	1.4	1.4	1.5	1.3	1.2	1.1	.9
Total	21.9	24.5	27.0	29.5	32.3	35.2	41.9
Other public:							
Softwoods	31.9	43.4	50.0	62.1	69.0	74.8	82.3
Hardwoods	3.8	6.8	9.8	8.6	5.9	4.0	2.1
Total	35.7	50.2	59.8	70.7	74.9	78.8	84.4
Forest industry:							
Softwoods	43.6	48.5	52.9	59.5	66.1	72.4	77.7
Hardwoods	7.7	9.5	11.6	10.3	8.8	8.0	7.4
Total	51.3	58.0	64.5	69.8	74.9	80.4	85.1
Farm and miscellaneous private:							
Softwoods	33.1	39.1	45.4	51.2	54.8	56.5	56.9
Hardwoods	7.7	10.0	12.4	10.6	7.7	5.4	3.4
Total	40.8	49.1	57.8	61.8	62.5	61.9	60.3
All owners:							
Softwoods	29.1	34.0	38.3	43.2	47.3	51.0	56.2
Hardwoods	4.3	5.6	6.9	5.9	4.6	3.6	2.8
Total	33.4	39.6	45.2	49.1	51.9	54.6	59.0

TABLE 75.—*Net growth rates of growing stock by owner class in the Pacific Coast Section, 1952, 1962, and 1970, with projections to 2020*

[Percent of inventory]

Owner class and species group	1952	1962	1970	Projections			
				1980	1990	2000	2020
National Forests:							
Softwoods	0.5	0.5	0.6	0.7	0.8	0.9	1.1
Hardwoods	1.8	1.7	1.7	1.4	1.2	1.0	.8
Other public:							
Softwoods	1.0	1.3	1.5	1.8	2.0	2.2	2.3
Hardwoods	2.7	3.3	3.7	2.3	1.3	.8	.4
Forest industry:							
Softwoods	1.0	1.4	1.8	2.5	2.9	3.2	3.3
Hardwoods	3.9	3.7	3.7	2.6	2.0	1.7	1.5
Farm and miscellaneous private:							
Softwoods	1.9	2.3	2.5	2.5	2.5	2.4	2.2
Hardwoods	3.0	3.1	3.2	2.2	1.4	.9	.5
All owners:							
Softwoods	.8	1.0	1.1	1.3	1.5	1.6	1.8
Hardwoods	2.9	3.0	3.2	2.2	1.5	1.1	.8

TABLE 76.—*Mortality of softwood growing stock and sawtimber per acre in the Pacific Coast Section, by owner class, 1952, 1962, and 1970, with projections to 2020*

Owner class	Unit	1952	1962	1970	Projections			
					1980	1990	2000	2020
National Forests:								
Growing stock	Cubic feet	25.1	24.8	24.2	23.5	22.9	22.5	22.0
Sawtimber	Board feet	141.0	136.1	129.2	120.7	112.6	104.9	91.4
Other public:								
Growing stock	Cubic feet	23.0	24.1	23.9	25.8	27.2	28.7	31.4
Sawtimber	Board feet	121.7	125.6	113.1	123.6	122.9	122.8	121.7
Forest industry:								
Growing stock	Cubic feet	27.5	22.3	19.4	16.5	16.0	16.8	20.0
Sawtimber	Board feet	158.3	120.3	95.4	73.7	63.7	60.1	62.6
Farm and miscellaneous private:								
Growing stock	Cubic feet	10.7	10.5	11.4	13.4	14.8	16.4	19.5
Sawtimber	Board feet	49.7	44.1	44.9	49.0	51.1	54.4	62.7
All owners:								
Growing stock	Cubic feet	21.7	20.9	20.4	20.2	20.4	20.9	22.2
Sawtimber	Board feet	118.8	110.3	101.7	96.6	91.4	87.8	83.5

Net growth and mortality of sawtimber in the Pacific Coast

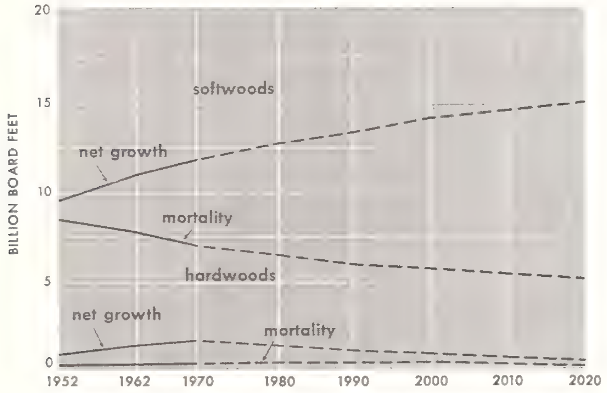

Figure 40

tions for National Forests and forest industry lands decline substantially thereafter. Projections for farm and miscellaneous lands show an increase over the period as a result of projected increases in inventories. Estimates for other public lands indicate relatively constant mortality per acre.

Trends in Inventory Volumes

The excess of removals over growth that characterizes the old-growth timber economy of the Pacific Coast States has resulted in a downward trend in inventories of standing timber (tables 68 and 69). Growing stock volumes dropped about 5 percent in the 1952–70 period and sawtimber volumes about 11 percent.

On a per-acre basis, volumes for all owners combined averaged 3,571 cubic feet and 18,347 board feet (tables 77 and 78). By the year 2020, average volumes are projected to decline further to 14.2 thousand board feet per acre, or 23 percent less than in 1970.

These projections indicate that the smallest sawtimber inventories per acre in the year 2020 will be carried on industry lands, with the largest inventories still on public lands. Only on farm and miscellaneous private ownerships does the projected average sawtimber volume per acre increase.

The prospective replacement of old-growth forests by younger age classes with smaller trees is evident by comparing these trends in sawtimber volumes with trends in growing stock volumes. For all ownerships combined, projections of inventories in cubic feet drop only moderately in this base projection, in contrast to a sizable drop in board feet inventories.

Although the Pacific Coast States will still contain most of the Nation's large trees over the next few decades, a shift toward smaller tree sizes can be expected, as illustrated by the following tabulation of percentage distributions of growing stock inventories by tree sizes for selected areas:

	National Forests, Western Oregon		*Other public, Western Washington*	
Tree diameter class (inches)	*1970*	*2020*	*1970*	*2020*
5 to 11	8	18	16	26
11 to 20	25	32	35	61
20 and larger	67	50	49	13
Total	100	100	100	100

TABLE 77.—*Inventory of growing stock per acre in the Pacific Coast Section, by owner class and species group, 1952, 1962, and 1970, with projections to 2020*

[Cubic feet]

Owner class and species group	1952	1962	1970	Projections			
				1980	1990	2000	2020
National Forests:							
Softwoods	4,366	4,348	4,268	4,105	3,958	3,836	3,673
Hardwoods	79	82	85	94	101	107	116
Total	4,445	4,430	4,353	4,199	4,059	3,943	3,789
Other public:							
Softwoods	3,115	3,328	3,319	3,356	3,403	3,458	3,534
Hardwoods	141	206	269	379	446	487	525
Total	3,256	3,534	3,588	3,735	3,849	3,945	4,059
Forest industry:							
Softwoods	4,278	3,419	2,953	2,401	2,271	2,292	2,337
Hardwoods	199	262	316	396	447	476	496
Total	4,477	3,681	3,269	2,797	2,718	2,768	2,833
Farm and miscellaneous private:							
Softwoods	1,768	1,721	1,850	2,073	2,213	2,337	2,541
Hardwoods	259	319	383	488	557	596	633
Total	2,027	2,040	2,233	2,561	2,770	2,933	3,174
All owners:							
Softwoods	3,533	3,431	3,352	3,252	3,199	3,180	3,164
Hardwoods	151	186	219	271	306	327	348
Total	3,684	3,617	3,571	3,523	3,505	3,507	3,512

	Forest industry, North Coast, California		*Farm and miscellaneous, Eastern Oregon*	
Tree diameter class (inches)	*1970*	*2020*	*1970*	*2020*
5 to 11	4	11	25	31
11 to 20	19	41	38	60
20 and larger	77	48	37	9
Total	100	100	100	100

ECONOMIC PROJECTIONS OF SUPPLY WITH 1970 LEVELS OF MANAGEMENT

Supplies of timber products available in any period depend not only on factors of timber inventories, growth, and established harvesting practices and trends, but also upon various economic, social, technical, and institutional factors that were only partially considered in the base projections presented above.[8]

Prices of timber and timber products in particular affect both the economic operability of existing timber resources and owners' willingness to sell. With rising prices of timber products and stumpage, many timber owners and operators could be expected to increase timber sales, harvests, and utilization, with resulting different relationships to timber growth than assumed in the base projections of timber supplies. Statistical information on supply responses to price changes is limited, however, and projections of economically available timber supplies therefore depend to a major degree on judgment.[9]

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[8] See for example: Morgan, James T. Three ways to look at Lake States timber supplies. Proceedings of the Society of American Foresters. Detroit, Michigan. p. 201–203. 1965.

Guttenberg, Sam. Converting forest resource statistics to timber supply. Proceedings of the 7th Conf. on Southern Industrial Forest Management. Duke Univ., Durham, N.C. p. 46–51. 1967.

[9] See for example:

Adams, D. M. The impact of changes on Federal timber sales policies on the Douglas-fir region forest economy: An econometric simulation. Ph.D. dissertation, Univ. of California, Berkeley. 1972.

McKillop, W. L. M. Supply and demand for forest products—an econometric study. Hilgardia 38:1–132. 1967.

Mills, Thomas J. An econometric analysis of market factors determining supply and demand for softwood lumber. Ph.D. dissertation, Michigan State University, East Lansing. 182 p. 1972.

Wall, Brian R. Relationship of log production in Oregon and Washington to economic conditions. USDA FS Res. Pap. PNW–147, 13 p. 1972.

TABLE 78.—*Inventory of sawtimber per acre in the Pacific Coast Section, by owner class and species group, 1952, 1962, and 1970, with projections to 2020*

[Board feet]

Owner class and species group	1952	1962	1970	Projections			
				1980	1990	2000	2020
National Forests:							
Softwoods	24,510	23,892	23,044	21,405	19,887	18,489	16,282
Hardwoods	248	274	289	314	331	346	366
Total	24,758	24,166	23,333	21,719	20,218	18,835	16,648
Other public:							
Softwoods	17,381	18,116	17,578	16,842	16,106	15,398	14,070
Hardwoods	403	606	804	1,131	1,354	1,499	1,657
Total	17,784	18,722	18,382	17,973	17,460	16,897	15,727
Forest industry:							
Softwoods	25,433	19,270	15,870	11,674	9,994	9,207	8,160
Hardwoods	636	812	973	1,194	1,325	1,388	1,400
Total	26,069	20,082	16,843	12,868	11,319	10,595	9,560
Farm and miscellaneous private:							
Softwoods	9,077	8,108	8,350	8,907	9,136	9,339	9,745
Hardwoods	744	953	1,184	1,538	1,780	1,920	2,052
Total	9,821	9,061	9,534	10,445	10,916	11,259	11,797
All owners:							
Softwoods	19,842	18,597	17,661	16,297	15,260	14,418	13,094
Hardwoods	455	572	686	846	955	1,020	1,080
Total	20,297	19,169	18,347	17,143	16,215	15,438	14,174

This section presents some estimates of supply-price relationships for softwood sawtimber, which represents a major and critical part of the total timber situation. No estimates of the economic availability of all softwood material or of hardwoods are available at this time. However, comparisons of the base projections with the following economic projections for softwood sawtimber may cast some light on possible trends in the economic availability of other material.

Recent Supply-Price Relationships for Timber Products

During 1971 and 1972 the reported index of wholesale prices of softwood lumber relative to the general price level increased about 40 percent, and for softwood plywood about 25 percent. Because of changes in the pattern of prices of different grades and sizes of these products associated with price control programs, however, the industry average of all sales appears to have risen somewhat more than these reported indexes. Reported prices of pulp and paper products showed little or no change in this short period.

Total harvests of softwood sawtimber from the U.S. forests for lumber, plywood, and other products rose some 4.6 billion board feet between 1970 and 1972, or a 10 percent increase (table 79). This included a 12 percent increase in domestic production of softwood lumber, a 29 percent increase in production of softwood plywood, and some decline in estimated production of pulpwood from sawtimber resources. Imports of softwood lumber increased 55 percent in this period in response to price increases that were reportedly greater than those prevailing under U.S. price controls.

The short-run elasticity of supply of domestic softwood sawtimber products in the 1970–72 period—defined here as the ratio between the percentage increase in total supplies of softwood sawtimber products and the percentage increase in weighted average U.S. wholesale prices of softwood lumber and plywood—was apparently between 0.2 and 0.3. This was not greatly different from apparent short-run supply responses to price changes for softwood sawtimber products during cyclical changes in most years of the 1950's and 1960's.

Longer run relationships between prices and supplies of timber products, however, have been quite different from short-run relationships in these recent decades. Factors such as the rise in

TABLE 79.—*Softwood sawtimber supplies at alternative price levels for lumber and plywood*

[Billion board feet]

Item	Actual			Projections			
	1970	1971	1972	1980	1990	2000	2020
Relative price index, softwood lumber and plywood	100	118	135	------	------	------	------
West—National Forests [1]	9. 9	10. 2	11. 9	------	------	------	------
At 1970 prices	------	------	------	10. 3	10. 2	10. 0	------
At 1970 prices plus 30 percent	------	------	------	11. 1	11. 0	10. 9	------
At 1970 prices plus 50 percent	------	------	------	12. 0	12. 0	11. 8	------
Base projection	12. 0	------	------	13. 0	12. 8	12. 5	12. 1
West—Other owners	20. 6	21. 0	21. 1	------	------	------	------
At 1970 prices	------	------	------	17. 5	15. 0	12. 5	------
At 1970 prices plus 30 percent	------	------	------	19. 0	15. 7	12. 0	------
At 1970 prices plus 50 percent	------	------	------	19. 8	16. 5	11. 0	------
Base projection	18. 5	------	------	15. 8	14. 2	14. 0	14. 0
West—All owners	30. 5	31. 2	33. 0	------	------	------	------
At 1970 prices	------	------	------	27. 8	25. 2	22. 5	------
At 1970 prices plus 30 percent	------	------	------	30. 1	26. 7	22. 9	------
At 1970 prices plus 50 percent	------	------	------	31. 8	28. 5	22. 8	------
Base projection	30. 5	------	------	28. 8	27. 0	26. 6	26. 2
East—National Forests	0. 5	0. 5	0. 6	------	------	------	------
At 1970 prices	------	------	------	0. 8	1. 4	2. 2	------
At 1970 prices plus 30 percent	------	------	------	1. 1	1. 6	2. 4	------
At 1970 prices plus 50 percent	------	------	------	1. 2	1. 8	2. 5	------
Base projection	0. 6	------	------	1. 2	1. 9	2. 7	2. 7
East—Other owners	15. 2	15. 7	17. 2	------	------	------	------
At 1970 prices	------	------	------	18. 2	20. 8	22. 3	------
At 1970 prices plus 30 percent	------	------	------	19. 6	21. 7	23. 3	------
At 1970 prices plus 50 percent	------	------	------	20. 4	21. 9	23. 0	------
Base projection	15. 9	------	------	18. 8	22. 0	25. 0	25. 1
East—All owners	15. 7	16. 2	17. 8	------	------	------	------
At 1970 prices	------	------	------	19. 0	22. 2	24. 5	------
At 1970 prices plus 30 percent	------	------	------	20. 7	23. 3	25. 7	------
At 1970 prices plus 50 percent	------	------	------	21. 6	23. 7	25. 5	------
Base projection	16. 5	------	------	20. 0	23. 9	27. 6	27. 7
U.S. total—National Forests	10. 2	10. 7	12. 5	------	------	------	------
At 1970 prices	------	------	------	11. 1	11. 6	12. 2	------
At 1970 prices plus 30 percent	------	------	------	12. 2	12. 6	13. 3	------
At 1970 prices plus 50 percent	------	------	------	13. 2	13. 8	14. 3	------
Base projection	12. 5	------	------	14. 2	14. 7	15. 2	14. 8
U.S. total—Other owners	36. 0	36. 7	38. 3	------	------	------	------
At 1970 prices	------	------	------	35. 7	35. 8	34. 8	------
At 1970 prices plus 30 percent	------	------	------	38. 6	37. 4	35. 3	------
At 1970 prices plus 50 percent	------	------	------	40. 2	38. 4	34. 0	------
Base projection	34. 4	------	------	34. 6	36. 2	39. 0	39. 1
U.S. total—All owners	46. 2	47. 4	50. 8	------	------	------	------
At 1970 prices	------	------	------	46. 8	47. 4	47. 0	------
At 1970 prices plus 30 percent	------	------	------	50. 8	50. 0	48. 6	------
At 1970 prices plus 50 percent	------	------	------	53. 4	52. 2	48. 3	------
Base projection	46. 9	------	------	48. 8	50. 9	54. 2	53. 9

[1] Projections assume 1970 proportions of operator-financed and federally financed roads as well as other practices at 1970 levels.

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relative prices of lumber and stumpage prior to 1950, for example, made it economically feasible to develop the timber resources in previously undeveloped areas in National Forests in the West and in British Columbia. This was also a period when recovery of forests in the South permitted increased timber harvesting, and when new technology broadened the raw material base and led to more efficient and expanded production in the plywood and lumber industries.

As a result of these developments more supplies of timber products became available at a given price level. This shift in supply-price relationships for softwood sawtimber was equivalent to an apparent long-run supply function of much greater elasticity than for short periods.

It is anticipated that timber supply-price relationships will continue to shift from decade to decade in the future as a result of prospective changes in timber resource conditions. Some anticipated changes represent a reversal of past trends, as in the Pacific Coast States where a continued shrinkage of timber harvests on industrial ownerships must be expected, particularly with 1970 management levels and policies. In other cases, as in the South, continuing increases in timber supplies from an expanding resource are anticipated. Supply prospects also differ by ownerships, as pointed out below.

Projected Supplies From National Forests

Estimates of potential supplies of softwood sawtimber from National Forests at alternative price levels, shown in table 79, were based on estimates of allowable harvests as established in 1970, modified by judgment as to timber operability, utilization potentials, and recent reevaluations of allowable harvests in some areas resulting from new environmental constraints.

Allowable harvest limitations.—On National Forests and on certain other Federal and State ownerships sales of timber are limited to the allowable harvests set by sustained yield policies and multiple-use standards and guidelines. Timber sales and harvests on public lands also may be restricted, at least temporarily as in the 1970–72 period, by such factors as environmental studies, law suits to halt timber cutting, and availability of funds and manpower.

Except for temporary increases in harvesting of timber already under contract, timber sales and harvests on these public lands cannot be increased significantly above allowable amounts, even with much higher demands and prices. Nevertheless, with increased prices timber on public lands can be utilized more closely, resulting in an increase in roundwood output and a corresponding reduction of residues on logging areas. Much of the material that could be made available in this way is suitable only for products such as pulp or particleboard, but some material can be utilized for lumber or plywood. Also, increased sales and harvesting of timber that may not be in the allowable harvest, such as certain thinnings, timber in remote areas, and increased salvage of dead timber, become more feasible with higher prices.

The amount of such possible increases in supplies of roundwood with higher prices varies in different areas, depending on such factors as amounts and types of materials left after logging, accessibility of areas logged, attitudes of loggers, equipment available, methods of pricing low-valued timber, and size and nature of available markets.

Supplies from western National Forests.—At 1970 prices and 1970 level of management, projected supplies of softwood sawtimber products from western National Forests total about 10 billion board feet annually—close to the actual harvest in 1970 and 1971 (table 79 and fig. 41). With prices 50 percent higher than in 1970, harvests are estimated to reach about 12 billion board feet annually.

Softwood sawtimber supplies
(1970 level of management)
total Western United States

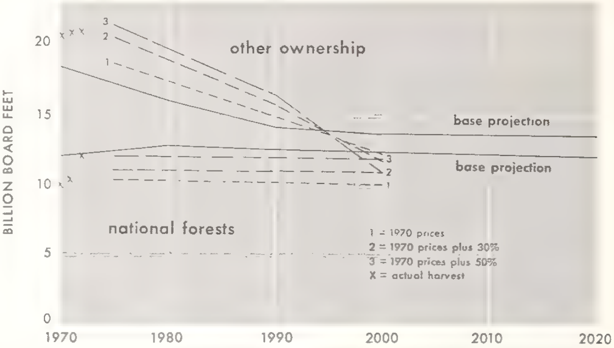


Figure 41

These estimates of potential timber harvests with higher prices largely reflect an anticipated increase in utilization on logging operations, increased thinnings and salvage, and—in the Rocky Mountains and Alaska—greater economic accessibility of some timber that would be inoperable at 1970 prices.

Supplies from eastern National Forests.—Harvests of softwood sawtimber from National Forests in the eastern United States, at 1970 prices and level of management, were estimated to increase from about 0.5 billion board feet in 1970–72 to 2.2 billion board feet by the year 2000 (fig. 42). This substantial rise in output reflects a continuing buildup of timber inventories that is expected on these lands and resulting rises in allowable harvests. With higher prices somewhat closer utilization also can be expected to lead to some additional modest increases in log supplies.

Total supplies from National Forests.—At 1970 prices and level of management, these projections show

Softwood sawtimber supplies
(1970 level of management)
total Eastern United States

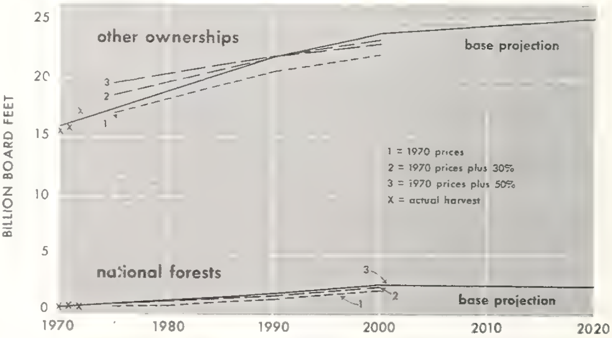


Figure 42

little change from the average of 11.2 billion board feet of softwood sawtimber actually cut in the period 1970–72 (table 79 and fig. 43). With price increases for lumber and plywood averaging 30 percent above 1970 levels, potential harvests of softwood sawtimber in 1980, for example, were estimated at 10 percent more than with 1970 price assumptions. With assumed price increases of 50 percent over 1970, potential harvests in 1980 were projected to 19 percent above the actual cut of 1970.

These economic projections of available softwood sawtimber supplies are lower than the base projections presented earlier in this chapter, which represented allowable harvests on National Forest lands as established in 1970. These lower estimates reflect in part new classifications of commercial timberlands, new environmental constraints on timber management, and particularly the fact that substantial inventories of National Forest timber in the Rocky Mountains and Alaska would not be economically operable except with timber product and stumpage prices substantially above 1970 levels.

Projected Supplies From Other Lands

Procedures for estimating prospectively available supplies of softwood sawtimber products from other lands varied somewhat by region and ownership.

Supplies from western areas.—Potential harvests of timber from public lands in the West were estimated on the basis of reported allowable harvests and possible increases in timber utilization in much the same way as for National Forests.

Estimates for private lands in the West were made on the basis of judgment as to (1) prospective economic operability of timber inventories at different price levels, and (2) consideration of owners' willingness to sell their timber. These judgments in turn were based on such factors as past responses to price increases, studies of owner attitudes toward selling timber, and possible impacts of changing technology on timber operability and utilization. The base projections of timber inventories and growth presented in the previous part of this chapter and several related projections using different cutting assumptions also provided some guides for these estimates.

Softwood sawtimber supplies
(1970 level of management)
total United States

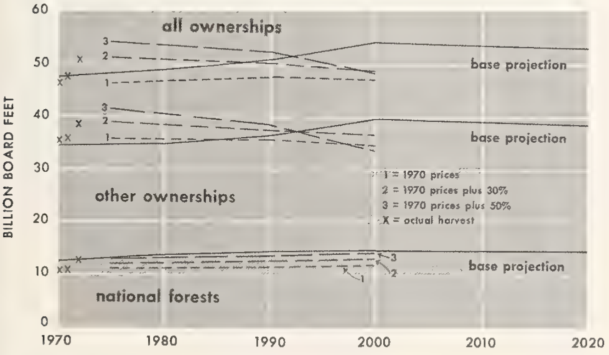


Figure 43

Timber harvesting responses to increased prices appear to vary widely among different owners. Some farm and miscellaneous private owners, for example, willingly increase timber sales as prices rise, whereas other private owners hold forest land and timber primarily for nontimber puposes, and have little or no interest in selling timber even at relatively high prices.

On industrial forest lands, cutting is often related to plant capacity or related long-term objectives that tend to limit increases in harvesting in response to rising prices. The time required to install new plant capacity or recruit additional workers also has a short-run influence on the rate at which supplies of lumber or other finished products can be increased in response to higher demands and prices.

With prices and management at 1970 levels, it is estimated that harvests of softwood sawtimber on other ownerships in the West would decline steadily from about 21 billion board feet of actual harvests in 1970 to possibly 12.5 billion board feet by 2000—a drop of 40 percent (table 79 and fig. 41).

With higher prices than in 1970, it is estimated that additional harvests of roundwood could be obtained by closer utilization of timber felled or formerly passed up in logging operations, by increased salvage of dead or dying timber, and by increased harvesting of other nongrowing stock. Supplies could also be increased by accelerated sale and harvesting of standing timber inventories.

At these higher prices, estimates based mainly on judgment show a more sustained trend in harvesting over the next couple of decades, but a sharp decline thereafter to lower levels than expected with 1970 prices. Holding cutting at higher levels during the 1970's and 1980's in response to relatively high prices would thus mean an accelerated reduction of supplies by 2000 and thereafter.

Supplies from eastern areas.—Projections of softwood sawtimber supplies from other ownerships in the East, with prices and management at 1970 levels, were based on the assumption that these owners would continue to sell or cut about the same percentage of standing timber inventories as in 1970. (Timber harvests on other ownerships in that year averaged 4.8 percent of softwood sawtimber inventories in eastern forests, compared to 3.5 percent in the West.) Because of the upward trend in timber inventories and growth on these lands resulting from past and current forestry programs, this procedure resulted in a projected increase of 47 percent in harvests of eastern softwood sawtimber between 1970 and 2000 (fig. 42).

With higher prices it was estimated, as in the West, that rates of harvesting would be further increased. A coefficient of supply-price elasticity of 0.5 was assumed in estimating initial responses to price increases for softwood lumber and plywood averaging 30 percent and 50 percent above 1970 levels. This meant an increase of 15 and 25 percent respectively in percentages of softwood sawtimber inventories harvested. These higher cutting rates were then used in the projection system to estimate annual changes in future harvests, net growth, and inventories.

Use of this procedure resulted in a significant increase in harvests of softwood sawtimber products above output estimated with 1970 prices throughout the period from the 1970's to the year 2000. These higher projections also are somewhat above the base projection for the 1970–1990 period.

Total supplies from other ownerships.—Under the assumption of 1970 prices and level of forest management, it is estimated that supplies of softwood sawtimber products from other ownerships in the United States would drop slightly from the actual harvest of 36.0 billion board feet in 1970 (table 79 and fig. 43). With price increases of 50 percent over 1970, on the other hand, supplies in the year 1980 might be roughly 5 billion board feet greater than could be expected at 1970 prices. By the year 2000, however, all projections for these ownerships show somewhat less timber available than was harvested in 1970.

Projected Supplies From All Ownerships

Projections of economically available supplies of softwood sawtimber products from all ownerships in the United States, at 1970 prices and management level, remain fairly close to the 1970 harvest of 46.5 billion board feet. (fig. 43). Projected decreases in supplies in the West just about offset increases in the East.

With an assumed increase of 50 percent in softwood lumber and plywood prices over 1970 levels, projected harvests in 1980 total about 53 billion board feet, but then gradually drop to less than 50 billion board feet by 2000, and to somewhat lower levels thereafter. Projections assuming a 30 percent rise in prices are intermediate between these two projections.

These price-related projections indicate that with increased prices roundwood supplies could exceed the base projections of timber supply developed earlier in this chapter at least for the next couple of decades. It is readily apparent, however, that with no increases over 1970 levels of management, accelerated timber harvesting would, in time, result in a reduction in both the quantity and quality of available roundwood supplies below 1970 levels of output.

It must be recognized that these estimates necessarily involve a large measure of judgment. The time paths of future harvests appear consistent with supply-price relationships in recent decades but could be quite different with major changes in prices, a tighter timber supply situation, or other factors. All the projections developed, however, indicate that if forest management and forestry investments are maintained at 1970 levels prospects for increased supplies of softwood sawtimber products are limited.

Available supplies of softwood sawtimber in the past have been used for both solid wood products such as lumber and plywood and for woodpulp. With higher timber prices there may be increased incentives to reallocate logs used for pulp to sawmills and plywood plants, with a shift of pulpwood procurement to residues and small or low-quality timber. Whether this occurs depends on numerous factors affecting competition for wood in many local areas.

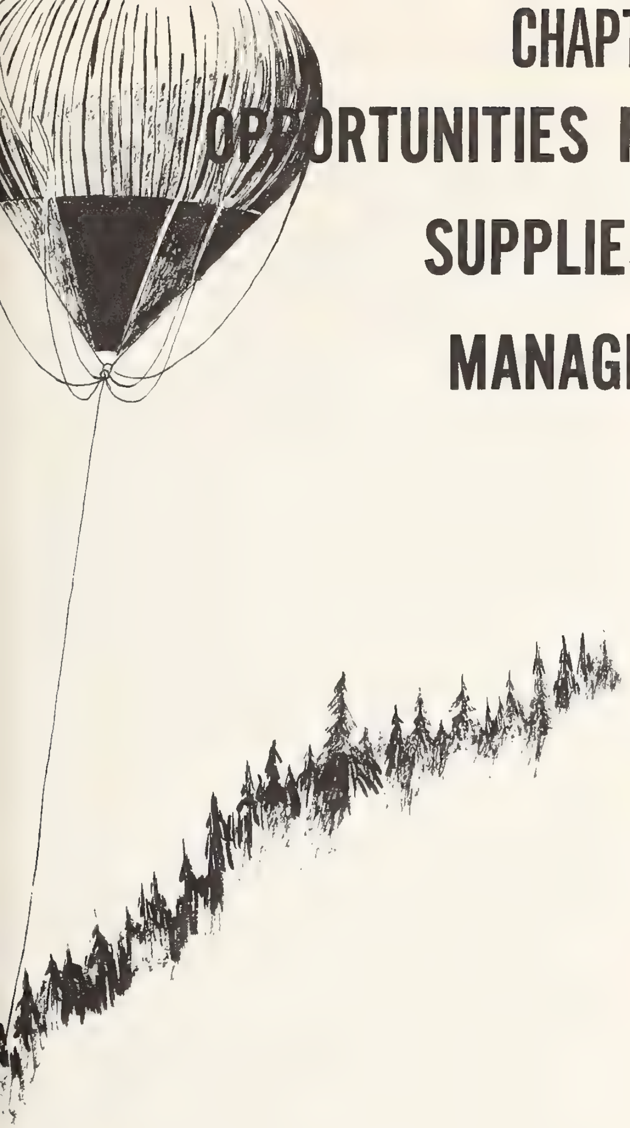
In addition to increased timber harvesting and closer utilization of available supplies expected with rising prices of timber products and stumpage, it seems likely that many industrial and some other forest owners would intensify timber management programs above 1970 levels.

The biological potential for future timber growth and harvests is considerably greater than the projections of potential supplies that could be anticipated with 1970 levels of management on National Forests and other ownerships. More of this potential could be captured by intensified management and utilization.

Some intensified management and utilization practices could have early impacts on timber supplies, particularly in areas with old-growth timber. Because of the time required to grow merchantable sizes of trees, however, such potential increases in timber supplies—though of major importance in the long run—would largely be realized beyond the projection period used in this analysis. Some information on possible opportunities for such intensification of forest management is presented in the following chapter.

CHAPTER III

OPPORTUNITIES FOR INCREASING TIMBER SUPPLIES THROUGH INTENSIFIED MANAGEMENT AND UTILIZATION



In this chapter estimates are presented of potential increases in timber supplies, over and above projected supplies with 1970 management levels as described in Chapter II, that might be achieved in coming decades by an acceleration of certain cultural measures and by closer timber utilization. The amount of such increases economically attainable will depend to a large degree on trends in timber prices, hence some price alternatives were considered in this analysis.

The following material includes a general indication of opportunities for intensified management of the Nation's forests. This is followed by a summary of an initial study of opportunities for intensified forestry on National Forests and farm and miscellaneous ownerships throughout the United States. More detailed case studies are then presented for the Southeast, Northeast, North Central, and Pacific Northwest regions to illustrate procedures for analysis and preliminary findings of intensification opportunities.

It is not possible with the data available at this time to estimate with a high degree of accuracy how much future timber growth and harvests might be increased as a result of higher levels of investment in forestry practices, nor related impacts on nontimber costs and benefits. The increases in timber supplies resulting from intensified management as described in this chapter are believed to be reasonable approximations, but much additional study will be necessary for more complete evaluations of potentials.

GENERAL OPPORTUNITIES FOR MANAGEMENT INTENSIFICATION

With 1970 levels of forest management and related harvesting and area assumptions, available supplies of timber from U.S. forests were projected to increase moderately over the next few decades. These projections, shown in Chapter II, are considerably below yields attained in fully stocked natural stands, and much less than yields attainable with intensive practices.

Both technical opportunities for increasing yields and economic returns from investments in intensified management vary widely from stand to stand and from place to place depending on a variety of factors. The examples of intensification opportunities described in later sections of this chapter indicate some of the variations in quantity, quality, and value of increased growth and harvests that might be obtained from selected treatments.

Differences in treatment opportunities stem in part from site and stand conditions. Thus the timber-growing capacity of commercial timberlands ranges from as little as 20 cubic feet per acre per year on the poorest sites included in the "commercial timberland" category to highly productive areas—mainly on the West Coast—that have the capability of producing more than 200 cubic feet of timber annually.

Stocking, species composition, tree diameter distribution, and regeneration requirements also vary widely in different stands and directly affect management opportunities. Additional factors of accessibility and operability of forest areas and nature of available markets also influence the economic feasibility of intensified management.

In many cases the necessity of modifying timber management to enhance environmental protection and to maintain recreation, wildlife, and aesthetic values increases management costs or reduces amounts of timber growth available for harvest. Areas such as roadside zones and scenic areas on the National Forests, for example, may provide some timber but only incidental to management for other uses.

Increased timber production on areas suitable for treatment, supplementing harvests prospectively available with 1970 management, can be achieved by a variety of measures, including accelerated regeneration, stand conversion, stand improvement, commercial thinning, fertilization, water control, improved harvesting practices, and intensified protection.

Regeneration.—Much has been done to improve regeneration following logging, both by modifying harvesting practices to obtain natural regeneration and by establishment of planted stands through site preparation and planting, or seeding. Establishment of plantations on abandoned farmland or other open areas has also been of large importance in the South and elsewhere. As pointed out in Chapter II, planting at the "1970 level" of management covered about 1.5 million acres annually.

Large additional gains in timber supplies can be achieved both by expansion of planting efforts and by greater use of genetically improved planting stock. Considerable progress has been made already in use of improved stock, particularly in the South where an estimated quarter of the planting stock seed used by the timber industry in 1970 came from selected superior trees.

About 15 percent of the 700 million seedlings produced by State and Federal nurseries in recent years has been grown with seeds derived from superior trees. Programs underway will steadily expand this proportion in the years ahead. Reduction of the regeneration period after logging also is of large importance, particularly in a number of western forest types.

Accelerated planting efforts, as in the case of much current planting, will often require such measures as clearing areas of economic size; piling, chipping, disking, or burning logging debris; bedding prior to planting to improve drainage; chemical destruction of competing vegetation; or combinations of such measures.

Stand conversion.—Many areas in both the East and the West Coast support poorly stocked stands of hardwood trees of inferior species or quality that can be expected to produce little volume or value growth. Clearing of such stands and planting to softwood is being done successfully on a rather wide scale on industrial and certain other lands, and numerous opportunities exist for expansion of such stand conversion programs, especially in the South. Also, in the case of certain stagnated stands of species such as lodgepole pine in the West, removal of the present trees and replacement by new stands of the same or different species is the only way to achieve full use of the site potential. Such conversion in some areas, however, may be limited by low sites or because of wildlife or other nontimber considerations.

Stand improvement.—Precommercial thinning in the early years of the life of timber stands in many cases has major impacts on timber yields. Such thinning produces no immediate usable wood but has its payoff in faster growth, shorter rotations, more growth in usable trees and higher quality wood.

In most timber types individual trees assert dominance over the others and stands develop efficiently. In other cases, crowding becomes progressively more serious and long rotations are required to produce merchantable wood. At its worst this crowding results in stagnation, especially on poor sites, with resulting spindly stands of small trees that never become merchantable—at least by prospective standards.

Precommercial thinning of heavily stocked stands is one of the major technical opportunities for increasing yields in many forests. Other measures that require out-of-pocket investments to increase timber volumes and values include removal of undesirable overstory trees in young stands having sufficient "crop" trees to utilize the site.

Commercial thinning.—Cutting of merchantable trees to improve spacing and stimulate growth of crop trees is still a relatively limited practice in the United States. Nevertheless, numerous research studies indicate that commercial thinning often can provide early returns, utilize material otherwise lost as mortality, and concentrate growth on the more valuable trees. This is particularly the case on lands where production of sawtimber is the objective of management.

In reaching decisions as to thinning opportunities, land managers in some cases must also consider certain adverse factors, such as possible logging damage to residual stands, increased fire hazards from thinning slash, problems of access in mountainous country, and problems of windthrow in some areas.

Salvage.—Harvesting of a larger portion of the 2.8 billion cubic feet of softwood timber killed annually by fire, insects, or other causes also represents an important potential for increasing log supplies in some areas.

Fertilization.—As indicated in the previous chapter, there has been increasing experience in recent years in the use of forest fertilizers to accelerate and improve tree growth. Most of the activity in this regard has been in the Pacific Northwest and in the South—practically all by industrial owners.

Experience suggests that timber yields can be increased rather substantially with applications of nitrogen and in some cases with other nutrients such as phosphorus. While adequate information is not yet available on costs and benefits of increased fertilizer application, it seems likely that fertilization will prove to be economically attractive on millions of acres of productive forest lands, particularly with increases in timber prices.

Protection against insects and diseases.—As indicated earlier, insects and diseases take a heavy toll of timber by killing trees and by reducing timber growth. The annual mortality and growth reduction attributable to only three pests, for example—western dwarf mistletoes, western bark beetles, and southern pine beetles—alone are estimated to equal about 13 percent of the current timber harvest.

A number of major protection programs against forest pests have been undertaken in past years. For the most part these have been only partially successful, presumably because not enough has been known about how to deal with these pests. More effective research and action programs could have the effect of materially increasing future wood supplies.

Timber yields could be enhanced, for example, through control of dwarf mistletoe, bark beetles, larch case bearer, and other insects and diseases through development and use of attractants, repellants, feeding deterrents, hormones, sterilants, and parasites, as well as use of pesticides and improved cultural measures.

Protection against fire.—The largest and most effective forestry effort in the United States, as pointed out in Chapter II, has been in the control of forest fires. The results have been remarkable, with a decline in area burned from 30 to 40 million acres annually at the beginning of the century to about 5 million acres annually, in the late 1960's.

There still appear to be important opportunities, however, to further reduce fire losses and costs through development and use of improved technology in fire prevention, presuppression, and suppression—including better understanding of ways to reduce numbers of fires, development of improved fire detection systems using airborne infrared equipment, for example, and development of techniques for more effective control of fires. Through such means fire suppression, particularly of large fires that characteristically result in most fire damage, could be more efficient and losses correspondingly reduced.

Fire losses also might be cut by reducing fuel accumulation on cutover areas through development of markets for logging residues and/or improved cleanup of cutover areas. Further improvement of techniques for use of prescribed fire in hazard reduction could also help reduce the intensity of and losses to wildfires.

The focus of improved protection efforts by fire control agencies is also suggested by data on areas burned annually, by cause. During the period 1966–70 the largest areas of forest land burned in the United States resulted from incendiary fires, followed by debris burning, lightning, and smokers.

THE ROLE OF RESEARCH

Much can be done to increase timber growth and harvests by utilizing existing technology. But investments in intensified management and utilization could be made more effective by improving the technological base for such efforts. More information is needed, for example, about the responses of forest stands of different types, ages, and sites to treatments such as thinning. Before the most effective tree fertilizing programs can be achieved more knowledge must be obtained on the response of trees on various soils, and effects of fertilizers on the environment. Research on genetic improvements in timber growing should include improved methods of progeny testing to detect natural resistance to insects and diseases.

There are substantial areas of poorly stocked forests, and areas where planting costs are high, where lower cost techniques for site preparation and planting would improve returns from forest investments. Better knowledge of spacing control in precommercial thinning and subsequent intermediate cutting could help increase output of both timber and nontimber values.

In many forest types development of more effective methods of timber harvesting that will insure natural regeneration of desirable timber species is of key significance in order to assure prompt and low-cost establishment of new stands and to protect aesthetic or other nontimber values. Improvement of aerial logging techniques using skyline systems, or helicopters, for example, could increase timber harvests as well as enhance environmental values.

It is not possible to quantify the impacts of accelerated research efforts, nor rates of subsequent extension and application of new technologies. However, it is believed there are substantial potentials for increasing timber growth and for extending timber supplies beyond projections in this chapter by development and application of improved technology.

THE IMPORTANCE OF FOREST OWNERSHIP

While there are many technical and economic opportunities for increasing timber growth and harvests in the various regions of the United States, a number of ownership constraints tend to limit practical increases in timber supply. The long investment period for most forestry practices is a significant barrier to intensified management by most private owners. Rates of return from timber growing investments usually are relatively low. And land use objectives and other factors also have a marked influence on the actions of forest owners.

Farm and miscellaneous private owners.—About 59 percent of the Nation's forest lands are owned by several million nonindustrial private owners—farmers, businessmen, housewives, power companies, mining companies, and numerous other occupational groups. A number of studies have shown that these owners have many objectives in owning forest lands, widely differing characteristics and attitudes, and varying willingness and capacity to invest funds in timber growing.[1]

In reporting on their objectives in owning forest lands, a minority of the nonindustrial private owners sampled stated that timber growing was their principal objective. Most of these owners, rather, held forest land for various nontimber goals such as recreation, wildlife protection, aesthetics, or speculation, with timber production a secondary goal at best. Most had little interest in making sizable investments in timber growing, and many owners were reluctant to harvest timber for environmental or other reasons. In the latter case, however, changing circumstances, such as need for income or change in tenure at time of death, have tended at some time in the life of most stands to result in willingness to harvest the timber that nature has provided.

Growing concern about future timber supply has led to adoption of a variety of institutional measures to encourage more intensive forestry on private lands, including general forest protection from fire and other destructive agents, public technical assistance and educational efforts, public cost-sharing of forestry practices on private lands, leasing of forest land by forest industries, pooling arrangements for management of small forest holdings, use of consultants, and legislative controls on timber cutting practices and forest protection.

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[1] McClay, T. A. Rating private nonindustrial ownerships for increased timber productivity and supply. U.S. Forest Service. (Processed.) 1971.

In view of the attitudes of forest owners revealed by various studies, it is not surprising that only a small portion of nonindustrial private owners with a small part of the private forest land have participated in these assistance programs of Federal, State, and private agencies. It was estimated as of 1970, for example, that only a quarter of the several million farm and miscellaneous private owners have sought marketing advice or other technical services.

Where owners have invested in forestry practices such as planting or stand improvement, financial standing and size of forest holdings have been most generally correlated with adoption of such practices. People with higher incomes appear more willing to make long-term investments as well as better able to take advantage of cost-sharing or technical assistance programs. Investors in timber production also tend to include people classed as "innovators" and owners with better than average knowledge of forestry. Such factors as occupation, length of tenure, age of owner, distance to residence from forest property, or method of acquiring property were not found to be strongly related to adoption of forestry measures.

The population of nonindustrial private owners also is constantly changing in terms of individuals, types of owners, and size of holdings. Thus in the southern States, forest land owned by farmers dropped from 48 percent of the total forest area in 1952 to 34 percent in 1970. In the same period the proportion of forest land held by a variety of miscellaneous owners rose from 27 percent to 39 percent of the total.

A very rough classification of the 296 million acres of the Nation's commercial timberland in farm and miscellaneous private ownerships, based upon interpretation of several ownership studies, suggests a breakdown about as follows:

a. Perhaps 5 percent of the land in these ownerships is intensively managed on a continuing basis. Tree crops are grown for harvesting and manufacture, with owners using all or most practices considered practicable. Most lands leased to industry fall in this category. This group is estimated to vary from as little as 2 percent of the total acreage of these ownerships in the North to as much as 8 percent in the South.

b. About a third of the farm and miscellaneous owners have some interest in forestry and manage their lands under extensive forestry practices that are usually unplanned or accomplished at random. This category includes most lands under long-term cutting contracts. This group varies from as little as 20 percent in the North to an estimated 45 percent in the South.

c. Owners of nearly half of these holdings display no interest in intensified forestry practices. From time to time owners sell timber grown by nature.

d. Possibly 15 percent of these ownerships are held by owners essentially for nontimber purposes. This includes land held for speculation as well as land held for recreation or other nontimber values.

Most forest owners have appeared to be more interested in simply obtaining periodic income from selling timber than in making forest management investments to increase future growth and returns. Participants in the Federal-State cooperative forest, management programs, for example, reported a 40 percent increase in area of forest land harvested during the period 1960 to 1970, but both timber stand improvement and planting activity on such ownerships decreased during this period.

A general conclusion reached in these investigations is that most forest owners do not consider timber growing investments to be sufficiently profitable to take priority over other investment or consumption opportunities. Many holdings are too small for efficient timber production. Also, in some cases, woodland owners must devote what time and money they have to obtaining other sources of income.

Increases in prices of timber could change this picture somewhat and lead to more investment in intensified management practices. New information on timber growing opportunities and more assistance also may be necessary to change landowner attitudes and willingness to invest in timber production.

Bringing additional owners into forestry programs would undoubtedly involve increasing expenditures per person assisted as programs reach less interested owners. But without such public and/or private action to persuade and assist forest owners intensify timber management, most holders of nonindustrial private lands cannot be expected to recognize and act upon opportunities for more intensive use of their timber resources.

Indifference of forest owners to management opportunities, and anticipated diminishing returns in expanding programs of "persuasion" thus suggests that all opportunities for timber management intensification, based upon a criterion such as 5 percent or more rate of return, are not likely to be realized. This likelihood has been considered, necessarily on a judgment basis, in the studies described below by adjusting estimates of areas "available" for intensified management in nonindustrial private ownerships.

Under these circumstances future timber harvests will depend largely on public programs of fire protection and control of insects and diseases, and natural regeneration of volunteer stands. Because of their widespread importance—59 percent of the total commercial timberland in the United States—future timber supplies will depend to a major degree on what is done on these lands.

Forest industry ownerships.—There still is a wide range in management intensity on forest industry lands, but the forest industries have made substantial advances in reforestation and other cultural and protection activities in recent decades. Surveys of forest industry holdings in the South, for example, indicated that if recent trends are continued most industry lands in that region will be under relatively intensive management by 1980.[2] Continued upward trends in forest management on industry lands would mean somewhat higher projections for these owners than shown in Chapter II, particularly after the year 2000.

Public owners.—National Forests and other public forest lands have been managed at variable levels of intensity. These agencies also must increasingly manage forest land with a variety of objectives, including not only timber but recreation, watershed protection, and other uses. The policy of sustained yield under which National Forest and many other public and some private ownerships are managed also limits the rate at which forest areas can be cutover, but management intensification nevertheless will often permit substantial increases in timber harvests on these lands.

ENVIRONMENTAL FACTORS RELATING TO INTENSIFICATION OF FOREST MANAGEMENT

Environmental considerations are having increasing impacts on costs of forest management and processing of timber products. They also affect acceptance of timber-growing and harvesting practices by the general public.

Intensification of forest management by such measures as thinning, timber stand improvement, reforestation, prescribed burning, fertilization, etc., and associated timber cutting, road construction, slash burning, or other disturbances, have varying impacts on forest resources and uses. It is difficult to generalize about the net impacts of intensified forestry practices on nontimber values. Conditions often vary widely, knowledge of specific impacts is generally lacking, and plus and minus factors may be offsetting.

Water yields, for example, will probably increase somewhat if a substantial portion of the timber in a drainage is removed. Excessive stream sedimentation, with a reduction in water quality, also could occur if roads and landings are not carefully planned and constructed. Forest fertilization will require careful application to minimize nutrient input to streams and lakes.

Habitat for some kinds of wildlife is generally improved with thinnings and other measures which open the forest canopy and increase supplies of food plants for game animals such as deer and elk. Conversion of brush fields or poor-quality stands by site preparation and planting, on the other hand, may damage habitat for other species of wildlife, particularly in plantations where complete forest canopies develop.

Recreational access for hunting and fishing and some other recreation travel is usually improved with road construction for logging and other forestry operations. Adverse recreational impacts are also common, however, as in cases where aesthetic qualities of forest areas for recreational viewing, hiking, or camping are reduced by logging operations. Consequently, management of "visual resources," particularly in mountainous areas in public ownership, may limit the extent to which timber management can be acceptably intensified.

Costs of land management must include careful design and location of roads and cutting areas if erosion or other environmental impacts are to be minimized. Fire control problems and costs likewise are likely to be increased with greater access to the forest and increases in production of slash or debris from expanded harvesting operations. Conventional slash burning and prescribed burning may be limited by opposition to resulting air pollution effects or other impacts.

Such environmental impacts from accelerated reforestation, stand improvement, or other forestry operation are likely to be limited at any given time to a small percentage of the total forest area. Thus an accelerated regime of accelerated management practices in the southeastern United States described below would cover less than 2 million acres annually, or roughly 1 percent of total commercial timberland in that region.

In West Coast stands under intensive management, it is estimated that entries into a forest will normally be made with some type of equipment every 10 years or so for such purposes as planting, precommercial thinning, commercial thinning, prelogging, and final harvest. It may also be necessary to enter the forests on other occasions for fire control or salvage of blowdown or insect-killed timber.

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[2] Guttenberg, Sam. Forestry goals and practices on large ownerships in the South. J. of Forestry 67(7):456–461. July 1969.

The type of soils and terrain and the type of equipment used are major considerations in determining the amount and consequences of such activities. Studies on National Forests in the Douglas-fir region, for example, showed that costs of road construction with adequate drainage, seeding of cuts and fills, and other desirable practices would require at least a 26 percent increase in road costs over construction formerly consideerd normal.[3] In some areas of difficult terrain, road construction also may be unacceptable in view of the need to protect scenic resources, prevent soil movement, or protect water values. Under such conditions timber harvesting may be feasible only with systems involving skylines, balloons, or helicopters.

In view of the growing importance of environmental factors, various modifications of forestry practices will be essential, particularly on public lands, to insure that intensification of timber management does not seriously impair the environment or damage nontimber uses. These may include treatment of relatively small areas, for example, and clean up of thinning and logging slash. Protection of stream channels for wildlife and water values will require that cutting be restricted along streams. Leaving uncut areas for animal escape and cover may be necessary to maintain desired animal populations. Programs for salvage of dead and dying trees may have to be avoided in some areas, and patches of other timber left to protect food supplies and nesting sites for certain animals and birds. Such practices may have appreciable effects on allowable cuts, particularly on public lands.

In evaluating opportunities in this chapter for intensification of timber management on public lands, estimates were made of the extra costs to protect environmental values. It is of course possible that still further emphasis on environmental factors may limit yields of timber more than assumed in this and the preceding chapter.

AN EXAMPLE OF POTENTIALS FOR INCREASING SUPPLIES OF SOFTWOOD SAWTIMBER IN THE UNITED STATES

In 1972 the Forest Service prepared a set of estimates of some possible nationwide increases in supplies of softwood sawtimber that might be realized through certain management intensification, using as a criterion economic returns on additional investments. This initial analysis necessarily involved numerous judgment estimates by field personnel as well as information from timber management plans, yield studies, and related available sources. Continuing studies to improve the data base and analytical procedures could result in considerable adjustment of the resulting estimates which are presented below.

The analysis of management alternatives in this initial study included only National Forests and farm and miscellaneous private holdings. No national estimates are available at this time for other public lands, which comprise 9 percent of all commercial timberlands, nor for forest industry lands which make up 13 percent of the total commercial timberland.

Forest industry owners already implement forestry programs for softwood production at relatively high levels compared with other owners. In 1971, for example, over half of all forest planting was on industrial land, although planting has covered only a small portion of the total areas harvested in recent years. It was assumed in Chapter II that industrial forest owners will continue planting and other timber management practices as in recent years. But there are undoubtedly additional opportunities for management intensification on industrial holdings, as well as on public lands, that are not included in this initial analysis. It is likely that many of these opportunities on industrial lands, and on other public lands, will be acted upon, particularly with the expectation of higher timber prices in the future.

Management practices considered in this study included reforestation, stand release, precommercial thinning, and commercial thinning and salvage.

Other measures such as fertilization and accelerated use of improved genetic planting stock, and increased utilization, were not specifically considered in this study. These also will presumably be feasible in some areas, and could of course supplement output beyond amounts estimated below.

The analytical process used to estimate potential increases in timber harvests from intensified management involved (a) a classification of areas in terms of physical conditions and related management options, (b) estimation of costs of intensified timber growing practices, including costs of environmental protection, on each class of forest land, (c) estimation of amounts, timing, and values of increased timber harvests over and above outputs with 1970 levels of management and the "base" projection of harvests shown in the first part of Chapter II, and (d) calculation of rates of return on increased investments and an economic ranking of investment opportunities.

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[3] USDA Forest Service. Douglas-fir supply study—alternative programs for increasing timber supplies from National Forest lands. 52 p. 1969.

In this study it was not possible to develop specific measures of relationships between treatments and nontimber uses and environmental factors. As indicated earlier, silvicultural activities influence the quality and quantity of water, recreation, grazing, and wildlife habitat, but whether these effects represent a net benefit or a net cost in given situations has been difficult to determine.

Area Classification

A classification of forest areas in each region was first made to group areas of more or less homogeneous conditions, treatment options, and potentials for management. This classification for most regions was based on factors of type, site, and stand-size class, such as indicated in tables 45–48 of Appendix I. In other areas stand age was also used in this classification. In the case of National Forests on the Pacific Coast, estimates were based on "project work inventories." Acreage figures developed in this way applied essentially to conditions existing in 1970, and did not include changes to be expected from future harvesting, for example, or shifts in land uses.

The second step was to classify each of the "cells" indicated above in accordance with general opportunities for intensified management, including the following general categories:

a. Areas on which economic opportunities for intensification of management are apparently limited because forests are already in good shape for timber growing. Yields may be inincreased in some cases, however, by commercial thinning, fertilization, or drainage. Where management objectives can be met with short rotations such as 25 to 30 years, as in certain plantations in the South, no treatment may be feasible because volume yields appear to be about the same with or without thinning. In other cases with longer rotations, as in the West, thinnings were considered appropriate to increase both volume and value growth.

b. Areas on which stands have passed the age where they would benefit appreciably from thinning or other cultural measures. It was assumed that such stands should merely be allowed to grow until ready for final harvests, although in some cases there may be opportunities for investments in protection, salvage of dying trees, or fertilization.

c. Areas of poor site quality which will not respond sufficiently to cultural treatment to make investments worthwhile.

d. Areas with existing stands that would yield substantial increases in timber volumes and/or values as a result of cultural practices such as precommercial or commercial thinning, or other measures such as fertilization or drainage.

e. Areas having little or no present or prospective timber values, but suitable for reforestation. These included areas of low stocking and poor hardwood stands that might be replaced with softwoods through stand conversion.

Selection of Areas for Analyses of Management Alternatives

From stands listed in subparagraphs above, estimates were made of acreages considered economically suitable for intensification of management. This selection, and estimation of acreages available, depended on such criteria as stand condition, accessibility, size of forest tracts, and preliminary estimates of potential returns from intensification. Estimates were also made of the areas being treated under on-going programs in deriving estimates of potential intensification.

In the case of farm and miscellaneous private lands an additional critical judgment was also made as to the area of commercial timberland held by owners considered likely to make investments in response to cost-sharing or other incentives. Without this assumption of technical assistance, areas "available" for intensification would undoubtedly be less than shown by the following estimates.

In this process 278 of the "most promising" classes of land were selected for detailed analysis of intensification potentials. These included some 4.5 million acres of National Forest lands, in contrast to a reported backlog of about 17 million acres considered silviculturally suitable for treatment, plus 12.7 million acres of farm and miscellaneous private lands.

Since these selections of areas to be studied were based in part on judgment, some economically promising areas undoubtedly were not included. On the other hand, some areas were included that may yield less than the indicated average rate of return for a given class of land. Additional areas of farm and miscellaneous private land beyond those included in this analysis also might be managed more intensively if "persuasion" costs could be lowered by finding more efficient ways of persuading owners to be responsive to management opportunities.

Costs of Intensified Management

Additional costs of intensified management for each of the strata selected for evaluation of management opportunities were based upon 1970–71 cost experience in the case of National Forest lands, and on reported costs for private forestry operations updated to 1970–71. Costs included both direct on-the-ground costs of treatment such as reforestation, together with certain costs of environmental protection and local overhead costs. Road construction costs were not included, nor were indirect costs of National Forest general overhead.

For farm and miscellaneous private lands, in addition to direct costs, technical assistance from public agencies was included as an overhead cost corresponding to technical supervision by National Forest field staff personnel. Federal costs for assisting owners of private land also were estimated assuming a 75-percent share of direct treatment costs, plus technical assistance. It was also assumed for this analysis that property tax levies or general administrative costs would not be changed appreciably by intensification of management.

Costs per acre of management intensification are influenced by many factors and vary widely from place to place and over time. Examples of ranges in costs assumed for National Forest lands are shown in table 80. An example of costs used for analysis of opportunities on farm and miscellaneous private lands in the South is presented in table 81. Other specific costs per acre appropriate to each situation studied were applied in analyzing local investment opportunities.

Yields From Intensified Management

Yields from accelerated management activities were estimated for each of the selected treatment situations in terms of the amounts of increased harvests that might be obtained, by decade, over and above yields to be expected with 1970 management levels. Yields from plantations, for example, were estimated from available plantation yield tables or through adjustment of normal yield tables, with the growth anticipated without reforestation subtracted therefrom.

Estimates of expected responses to treatments such as precommercial thinning, involving estimates both with and without treatment, were based upon local studies or local judgments as to responses to be expected. Information on response to different management activities is quite limited and it was consequently necessary to depend to a considerable degree on judgment of forest research and management personnel familiar with local conditions.

TABLE 80.—*Range of direct costs per acre for intensified management on National Forests, 1970–71* [1]

[Dollars]

Region	Reforestation [2]	Precommercial thinning	Stand release
North	30–80	15–25	15–25
South	25–60	10–20	15–25
Rocky Mountain	40–70	25–40	15–20
Pacific Coast	60–70	25–40	15–20

[1] Total costs on National Forests are approximately double these estimates due to indirect costs charged against a project but not incurred "on-the-job."

[2] Includes planting and varying degrees of site preparation.

TABLE 81.—*Estimated treatment costs of accelerated management on nonindustrial forest lands in the East, 1970–71*

[Dollars per acre]

Items	Average	Range
Site preparation	20	5–40
Natural regeneration:		
Pine type	5	
Oak-pine type	15	
Hardwood type	15	
Artificial regeneration:		
Pine type	15	
Oak-pine type	20	
Hardwood type	25	
Stand conversion	25	10–50
Average stand d.b.h. under 10 inches or basal area under 50 square feet	20	
All other conditions	30	
Planting:		
Pine by machine	15	10–25
Pine by hand	20	15–35
Hardwood by hand	35	25–50
Direct seeding pine	10	5–20
Aerial	7	
Ground	13	
Timber stand improvement:		
Cull tree removal	10	2–15
Precommercial thinning and cleaning	15	5–30
Marking:		
Commercial thinning and cull tree removal	4	2–10
Precommercial thinning and cleaning	8	5–15
Prescribed burning	1. 50	0. 25–3. 50
Fertilization	20	10–30

Source: Based on data in McClay, T. A. *Treatment costs—southern supply study.* USDA Forest Serv., Div. Forest Econ. and Mark. Res. office report. 1969.

Values of Increased Yields

In the initial analysis of management opportunities, values of the increased timber harvests resulting from intensification of management on

TABLE 82.—*Sawtimber stumpage prices on National Forests, by region, 1970–71*

[Dollars per MBM, Scribner scale]

Species	Northern Rocky Mountain	Southern Rocky Mountain	California	Pacific Northwest	South	North
Doulas-fir	5–12	2–8	[1] 20	[1] 27	------	------
Ponderosa pine	12–17	5–20	[1] 24	[1] 14	------	------
Lodgepole pine	8.50	3	3	5	------	------
Fir-spruce	7–9.50	3–7	14	14	------	------
Larch-western white pine	21	------	------	14	------	------
Mixed conifers [2]	15	------	------	------	------	------
Southern pine	------	------	------	------	52	18
Red pine-white pine	------	------	------	------	30	25

[1] Reduced to 65 percent of reported rate based on R–6 study comparing current old-growth and second-growth timber prices.

[2] Weighted average of all conifers except lodgepole pine—based on CY 1971 timber sales in R–1.

TABLE 83.—*Stumpage prices for timber from farm and miscellaneous ownerships, 1970–71*

Average d.b.h. of timber	Southern pine	Eastern white pine
Inches	*Cents per cubic foot*	*Cents per cubic foot*
6	7	2
8	11	5
10	12	8
12	14	12
14	15	16
16	17	18
18	18	20
20	20	22

National Forest lands were based upon 1970–71 stumpage prices, as shown in table 82. These ranged from negligible values for some hardwoods removed in conversion programs, for example, to as much as $52 per thousand board feet for increased output of southern pine sawtimber and $27 for Douglas-fir sawtimber. The latter figure, derived by adjustments from old-growth timber sales, may be conservative.

Stumpage prices used in calculations of values of increased harvests on farm and miscellaneous private ownerships in the South, for example, are shown in table 83. These were derived from various local price reports and local studies of value differentials by tree diameter class.

A second set of estimates of values of potential harvest increases also was developed assuming a higher level of timber products and stumpage prices. These assumed a 30 percent rise in softwood lumber and plywood prices over 1970, and an assumed $20 per M board feet increase in stumpage values, except for lodgepole pine for which price increases were assumed to average $12 per M board feet. No adjustments were made for changes in relative costs of intensification, partly because these occur early in the investment period.

Both price assumptions were used in evaluations of rates of return on investments in intensified management in order to provide some measure of sensitivity to price. Because of the general outlook for increasing prices of timber in future years indicated in Chapter VI, the analysis with the higher price assumption is believed to provide a more realistic view of potential investment returns.

Ranking Opportunities

Several indicators of economic ranking of investment opportunities were calculated in this analysis from the schedules of treatment costs and increased yields and values. These included rate of return on increased investments before income taxes, increases in present net worth, and benefit-cost ratios.

For the summaries presented below opportunities were evaluated and ranked in terms of rate of return. Most estimates were related to a minimum rate of return of 5 percent—an arbitrary rate that might be considered reasonable to illustrate this type of investment analysis. The opportunities for intensification indicated by this criterion have been designated "most promising," in recognition of the selection process used.

Increased Yields From Farm and Miscellaneous Private Lands

Areas.—At 1970–71 average prices and costs, these estimates indicated that about 9 million acres of the 12.7 million acres studied in detail would return more than 5 percent on additional costs of accelerated management (Append. III, table 1). Nearly half of the 9 million acres would yield returns of more than 7.5 percent. An estimated 3.7 million acres of the area studied would yield from 2.5 to 5 percent return at 1970–71 prices.

Costs.—Costs of accelerated practices on the 9 million acres with returns in excess of 5 percent at 1970–71 prices were estimated at $346 million, or an average of somewhat more than $38 per acre. A major share of this cost was assumed to be provided by public agencies.

Out-of-pocket costs per unit of increased output over the next 50 years, excluding interest on investments, were estimated at about $6 per M board feet.

Additional harvests.—The estimated additional harvests resulting from intensified practices on 9 million acres total nearly 56 billion board feet spread over the next 50 years, or an average of somewhat more than 1.0 billion board feet annually. However, harvest increases are relatively small until year 25 or so, after which harvests increase rapidly. In the first two decades some limited volumes are available from commercial thinning and from removal of softwoods on areas converted to plantations. The major portion of increased yields become available after 2 or 3 decades, reaching 2.5 billion board feet per year in the fifth decade (fig. 44 and Append. III, table 1). This timing reflects the predominance in these figures of reforestation opportunities in the South, and an assumption of short rotations.

With a one-time intensified 10-year program as assumed in this example, harvest increases rise to a peak then drop off after the fiftieth year. However, it is anticipated that a series of intensified programs would be economically feasible in future periods as a result of changing forest conditions following harvesting or other forest disturbances. Thus increases in timber harvests could be maintained or increased over longer periods by such a series of programs, as illustrated later.

Increased annual harvests of softwood sawtimber on nonindustrial private lands resulting from intensified management of 12.7 million acres, by rate of return at 1970 prices

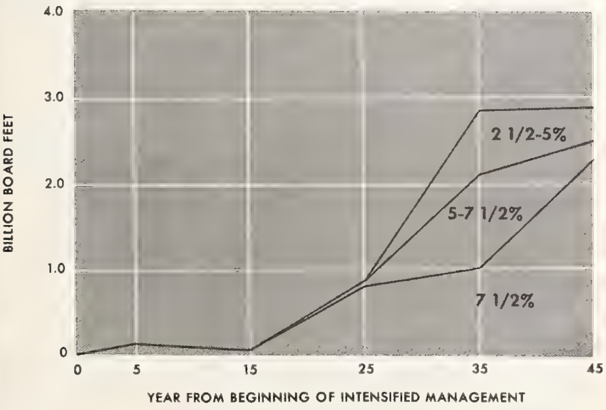

Figure 44

Harvest schedules shown in figure 44 represent a summation of harvest schedules for individual situations without adjustments for factors such as maintenance of a given flow of timber harvests over time. It was also assumed that the entire acreage listed would be treated over the next decade if funds were available. Areas considered suitable and available for treatment already have been scaled down for economic and ownership reasons, as indicated earlier, but it is of course possible that intensification might have to be spread over a longer period.

Increased Yields From National Forest Lands

A similar analysis of opportunities for accelerated reforestation and stand improvement on National Forest lands was developed, including evaluations both with and without an "allowable cut effect," that is, an almost immediate increase in harvesting of overmature stands following intensification of management in anticipation of a higher level of timber availability in future years.[4]

Potential increases in harvests resulting from intensified management on western National Forests are shown in table 2 of Appendix III with an allowable cut effect, but calculations of rates of returns were based initially upon harvests from individual treatments without allowable cut effects. This procedure was followed partly because of uncertainties as to allowable cut effects, and partly to have direct comparisons with returns from alternative investments and alternative areas.[5] If allowable cut effects are utilized in the rate of return analysis, returns are increased substantially, as illustrated by the following example:

Treatment	*Rate of return*	
	With allowable cut effect	*Without allowable cut effect*
Reforest spruce fir, site 3	7.3	1.7
Release mixed conifer, site 3	21.6	5.9

Area treated.—The resulting estimates—that is, calculating rate of return from individual treatments without credit for allowable cut effects—indicate that at 1970–71 prices and costs, roughly 1.7 million acres of the 4.5 million acres studied in this analysis would produce more than 5 percent return on accelerated investments (Append. III, table 2). If returns were calculated with the allowable cut effect, most of the 4.5 million acres studied would return more than 5 percent on increased management investments.

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[4] See, for example: Schweitzer, Dennis L., Robert N. Sassaman, and Con H. Schallau. Allowable cut effect—some physical and economic implications. J. of Forestry 70(7): 415–418. 1972.

[5] Haley, David. The economic analysis of activities designed to accelerate stand growth in the context of the managed forest. Paper presented at Western Forestry and Conservation Association. Seattle, Washington. December 6, 1972.

Costs.—Additional costs required for intensification on these 1.7 million acres were estimated at $82 million—an average of $50 per acre. This included $41 million of direct costs for on-the-ground activities. Estimated costs for intensification on 4.5 million acres total $356 million—an average of $79 per acre.

Harvest increases.—Increased harvest yields over the next 50 years on the most promising 1.7 million acres of National Forest land are estimated at about 25 billion board feet of softwood sawtimber, or an average increase of 0.5 billion board feet per year. Projected yield increases total an estimated 350 million board feet annually by the fifteenth year and 780 million board feet by the forty-fifth year.

Increased harvests from the entire 4.5 million acres of National Forest land included in this analysis would amount to an estimated 68 billion board feet over the next 5 decades or an average of 1.4 billion board feet per year. These increased yields would peak at about 1.8 billion board feet annually in the fifth decade.

It is possible that the allowable cut effect involved in these estimates of increased timber harvests may be overstated somewhat. One reason relates to time lags in accomplishing accelerated programs. Another relates to delays before effects are allowed for in revised timber management plans. Also, allowable cut effects in this example were based upon reserves of merchantable timber by geographic sections, rather than by specific management units such as used in management plans. If allowable cut effects are not considered, and increases in harvests become available only after timber from treated areas matures, the projected increased cuts resulting from intensification of management would be deferred much further into the future than shown in Appendix III, table 2.

Sensitivity to Price Assumptions

The effect of using alternative assumptions as to future relative prices of timber has also been illustrated by assuming a 30-percent increase in relative lumber and plywood prices over 1970–71 levels and related stumpage prices as shown in tables 82 and 83.

Farm and miscellaneous private lands.—At these higher price levels, all 12.7 million acres of farm and miscellaneous private lands studied in this analysis would return more than 5 percent on investments in intensified management—in contrast to 9 million acres at 1970 prices (Append. III, table 3). By far the major part of these investment opportunities were for reforestation, with lesser areas meeting criteria for commercial thinning and timber stand improvement. More than 90 percent of the acreage of these estimated opportunities for intensification were located in the South.

Intensified management of the 12.7 million acres studied would require an estimated $546 million, or about $43 per acre, and about $8, excluding interest, per M board feet of increased output over the next 50 years (1970–71 prices).

Estimated increases in timber harvests from 12.7 million acres reach an estimated peak of 2.9 billion board feet in the fiftieth year, in contrast to about 2.5 billion board feet from 9 million acres, and a total of 69 billion board feet over the 50 year period.

National Forest areas.—With the higher price assumption, some 3.2 million acres of National Forest land would return more than 5 percent on increased reforestation and stand improvement, compared with 1.7 million acres at 1970–71 prices (Append. III, table 4). Timber stand improvement accounted for the major part of the indicated investment opportunities on National Forest lands, followed by reforestation of nonstocked lands in old cutovers and burns. Reforestation of newly harvested areas was assumed to be provided for as part of 1970 levels of management.

Intensified management on 3.2 million acres was estimated to cost $191 million—about $60 per acre.

The 3.2 million acres of National Forest land on which returns of more than 5 percent could be expected at the higher prices would yield an estimated additional harvest of 480 million board feet annually in the first decade, and 1.3 billion board feet per year by the fifth decade. These estimates of yields assume significant allowable cut effects on timing of harvests in western regions.

Inclusion of the entire 4.5 million acres analyzed would produce increases in future harvests reaching 1.8 billion board feet per year in the fifth decade (Append. III, table 4). With the allowable cut effect included in calculating rate of return, most of this area would return more than 5 percent on additional investments.

Additional yields from commercial thinnings on National Forests.—Opportunities for commercial thinning on National Forest lands were not evaluated in comparable detail in this initial study of investment opportunities. However, preliminary estimates based on judgments of field personnel indicate that increased harvests from commercial thinning and salvage operations on National Forests might total about 1.1 billion board feet annually (International ¼-inch rule) by 1980, increasing to 2.3 billion board feet annually by 2000. These largely represent "silvicultural" operations that would be possible on accessible areas of "standard" timber growing lands, excluding eastern forests, Alaska, and lodgepole pine stands, assuming some increases in prices over 1970 levels.

Substantial road construction and increased expenditures for timber sales would be necessary to achieve these increases, hence these opportunities were not included in Chapter II under 1970 levels of management. Somewhat more than half of these estimated thinning potentials are in the Rocky Mountain area and the remainder on the Pacific Coast.

Possible Succession of Treatment Programs

The estimates developed as described above assumed one 10-year program of intensification. In some areas such as the South, it seems likely that programs of similar magnitude could be repeated in subsequent decades, with reasonably similar increases in yields. The area involved in this preliminary analysis of "most promising" opportunities is a relatively small part of the total commercial timberland.

In other areas such as the Pacific Coast the extent and mixture of treatment opportunities might be quite different. In assuming "continued" programs it is recognized that errors may be in the direction of overstating opportunities since repeated programs should in time exhaust the best opportunities, with resulting smaller additions to yields and poorer investment opportunities.

Increased harvests within the projection period 1970–2020 would be obtained from intensification programs conducted in the 1970's and 1980's. A sequence of programs would provide additional harvests but most of these would become available beyond the 50-year projection period of this study.

Increases from farm and miscellaneous private lands.—An example of continuing programs of intensified reforestation, stand improvement, and commercial thinnings assumed treatment of an estimated 1.3 million acres annually over the next three decades at a cost of $54.6 million per year—an average of $43 per acre (Append. III, table 5). Estimates developed as described above indicate this level of activity would return more than 5 percent on investments at 1970 prices plus 30 percent.

Projected increases in annual harvests of softwood sawtimber with this regime reach 1 billion board feet by the twenty-fifth year and 6.8 billion board feet by the forty-fifth year, as illustrated in figure 45.

Increases from National Forest lands.—A continuing program of intensification, including stand improvement at the same rate as in the 10-year program and reforestation of 0.84 million acres over a 20-year period, would cover an estimated 275 thousand acres annually, at a total cost of $14.5 million per year (Append. III, table 6). Increased harvests of softwood sawtimber resulting from such continuing efforts are estimated at 1.1 billion board feet by the fifteenth year, increasing to over 4 billion board feet per year by the forty-fifth year (fig. 45).

Softwood sawtimber supply alternatives

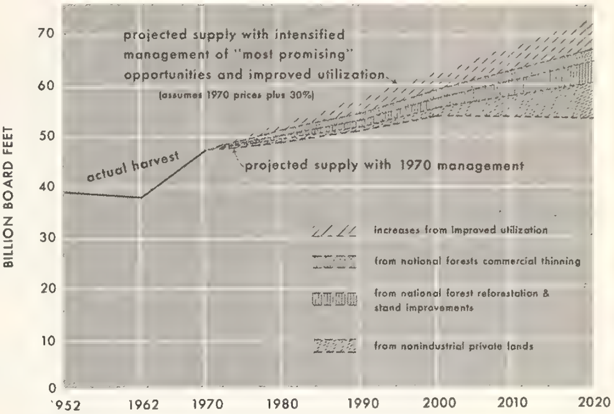

Figure 45

Summary of Potentials for Intensification of Management

Possible increases in harvests from a continuing series of programs of intensified management on lands estimated to represent the "most promising" opportunities for intensification are summarized in figure 45 and table 84. These estimates assume a criterion of 5 percent or more return on investments, prices of softwood lumber and plywood 30 percent above 1970 levels, and an allowable cut effect in estimating increases in yields on National Forest lands.

These selected opportunities would provide an additional 1.6 billion board feet by 1980 and as much as 13 billion board feet by 2020. Estimated annual costs (1970–71 dollars) total $73.7 million for reforestation and stand improvement. Funds for road construction, timber sale administration, and general agency overhead are not included in these figures. The estimated increases in harvests from such a program amount to 3 percent more than projected supplies with 1970 levels of management by 1980 and 25 percent more by 2020.

These estimates of potential increases are necessarily preliminary. They could be extensively revised as a result of continuing research underway on timber yields and other factors bearing on response to management.

General Comparison of Alternatives Studied

The data summarized in this analysis of the "most promising" available opportunities for intensification beyond 1970 forest management levels indicate that additional program expenditures can be made only with progressively lower cost effectiveness. Thus inclusion in the National

TABLE 84.—*Projected increases in softwood sawtimber supplies from continuing programs of intensified management of selected areas*

Ownership	Area treated annually	Annual costs	Increased harvests, by year				
			1980	1990	2000	2010	2020
	Million acres	*Million dollars*	*Billion bd. ft.*	*Billion bd. ft.*	*Billion bd. ft.*	*Billion bd. ft.*	*Billion bd. ft.*
Nonindustrial private	1, 270	54. 6	0. 1	0. 2	1. 0	3. 9	6. 8
National Forests:							
Reforestation and stand improvement	275	14. 5	. 4	1. 1	2. 0	3. 0	4. 1
Commercial thinning	n.a.	(¹)	1. 1	1. 4	1. 7	2. 0	2. 2
Total			1. 6	2. 7	4. 7	8. 9	13. 1

[1] Requires substantial costs for road construction and timber sale administration.

Forest analysis of reforestation opportunities that fail to yield 5 percent at 1970 prices plus 30 percent would raise annual costs by over 55 percent, while increasing harvests by an estimated 12 percent in year 45 after program initiation (Append. III, table 6).

This analysis also indicates that estimated future harvest increases from the "most promising" opportunities studied on farm and miscellaneous private lands come mainly from reforestation. Almost the opposite occurs on National Forests where most of the estimated harvest increases possible with the specified economic criteria are derived from increased timber stand improvement.

Both a higher general level of profitability on farm and miscellaneous private lands, and the preponderance of reforestation opportunities on these ownerships, are as one would expect. Farm and miscellaneous private lands generally have a higher inherent productivity, especially in the South where over 75 percent of the "most promising" private opportunities occur. Also, National Forest lands are already operated at higher levels of intensification than most farm and miscellaneous private ownerships.

Additional Management Opportunities

There are undoubtedly additional opportunities for intensified timber management beyond those indicated in this initial study that would yield more than 5 percent on additional investments. The judgment process of screening promising situations no doubt excluded some areas where intensification would be profitable. With a multitude of situations, however, some screening process is essential. Prices higher than assumed in this study would also increase the attractiveness of management intensification.

In addition, increases in timber growth and harvests are surely obtainable from intensified management on many industrial and other public lands that were not covered in this analysis.

Further additions to timber supplies might be obtained from such measures as increased forest fertilization, more intensive forest protection against fire, insects, and diseases, and accelerated genetic improvement of planting stock.

The use of criteria other than the conventional rate-of-return concept used in this illustration of the "most promising" opportunities could also lead to adoption of different programs of forest management than illustrated in this chapter. These might include such economic and social criteria as indirect and secondary benefits from maintenance of a viable forest economy in areas where forest industries are established. Other criteria might include a goal of avoiding adverse economic and environmental impacts resulting from higher timber prices and shifts to competitive materials. Still another goal could aim to assure ample timber supplies than would otherwise exist as a hedge against the long-range future when scarcities of raw materials may be more general.

Other opportunities for extending timber supplies through closer utilization also are outlined in a later section of this chapter.

AN EXAMPLE OF OPPORTUNITIES FOR INTENSIFYING FOREST MANAGEMENT IN THE SOUTHEAST

Results of this analysis of timber management investment opportunities in the Southeast were included in the national summary just described, but are presented here in greater detail to illustrate some of the procedures that may be used in investment analyses.

The Southeast, including Florida, Georgia, South Carolina, North Carolina, and Virginia, is one of the Nation's primary timber producing regions, with forests occupying some 93 million acres, or almost 63 percent of the land area. Because of differences in species composition, site

TABLE 85.—*Timber supplies in the Southeast, assuming 1970 level of management*

Species group	1970	Projections		
		1980	2000	2020
	Million cubic feet	*Million cubic feet*	*Million cubic feet*	*Million cubic feet*
Softwoods	1, 799	2, 132	2, 774	2, 788
Hardwoods	1, 059	1, 317	1, 736	1, 719
Total	2, 858	3, 449	4, 510	4, 507
	Million board feet	*Million board feet*	*Million board feet*	*Million board feet*
Softwoods	5, 833	6, 989	9, 258	9, 417
Hardwoods	2, 942	3, 380	3, 429	3, 440
Total	8, 775	10, 369	12, 687	12, 857

capability, land ownership patterns, and other forest characteristics, opportunities for altering prospective timber supplies vary widely.

Estimates of possible increases in timber supplies from intensified management were calculated by taking as a base the projections of prospective timber supplies assuming 1970 levels of management and the cutting and area assumptions specified in Chapter II. In brief, these projections showed prospective increases in available timber removals amounting to 58 percent by 2000 in the case of growing stock material and about 45 percent in the case of sawtimber (table 85).

Identifying Areas Suitable for Intensified Management

1. The first step in identifying opportunities for intensified management over and above that provided at 1970 levels was to break down the total forest area into meaningful management classes. These involved some 89.8 million acres classified as commercial timberland, plus an estimated 2.4 million acres of idle cropland which was included under the presumption that part of these lands would represent an opportunity for increasing future timber supplies. Although a detailed breakdown of these lands by management condition would be desirable, practicality required focusing on a limited number of "treatment opportunity" classes, as shown in table 86.

2. The second step involved the elimination from detailed analyses of areas not considered suitable for intensification of management. These included:

a. Areas of low timber potential because of poor or adverse sites; in this initial effort areas incapable of producing more than 50 cubic feet of timber per acre when fully stocked with trees were eliminated. This involved some 26.4 million acres. This procedure reduced National Forest areas to 43 percent of the total acreages listed in table 86, compared to 76 percent for forest industries, and 73 percent for farm and miscellaneous private lands.

b. Areas already in good condition from the standpoint of timber culture. Standards of good condition were based on forest characteristics such as type, stand size, stand age, volume, and growth, and available results of management research and experience. This procedure eliminated 19.3 million acres.

c. Areas occupied by mature stands ready for harvest and regeneration, amounting to 9.2 million acres. In some cases production on these areas could be increased by fertilization or by use of improved genetic stock for regeneration following logging, but these opportunities were not evaluated.

The areas remaining after this process included 10.7 million acres of young stands judged to be

TABLE 86.—*Area of commercial timberland in the Southeast, by ownership and treatment class, 1970*

[Million acres]

Class	Total	National Forest	Other public	Forest industry [1]	Farm and miscellaneous private
Poor sites	26. 4	2. 6	1. 4	4. 3	18. 1
Stands in good condition	19. 3	. 5	. 6	5. 3	12. 9
Harvesting	9. 2	. 5	. 3	1. 8	6. 6
Intermediate cutting	10. 7	. 3	. 4	2. 1	7. 9
Conversion or regeneration	26. 5	. 7	. 7	4. 3	[2] 20. 8
Total	92. 1	4. 6	3. 4	17. 8	66. 3

[1] Includes lands under long-term lease.

[2] Includes 2.4 million acres of idle cropland.

overstocked, plus 26.5 million acres on which a manageable stand was lacking and which would contribute very little to the timber supply until converted, planted, or regenerated (table 86). Results of this analysis clearly indicated that within each ownership class there is a large accumulation of idle, nonstocked or poorly stocked acres where planting, conversion, or regeneration will be necessary if the large differences between prospective and potential timber yields from the lands are to be eliminated or reduced.

Of the 10.7 million acres of young immature stands identified as overstocked, a commercial thinning opportunity was estimated to exist on 7.8 million acres. On the remaining 2.9 million acres, it was judged that precommercial thinning would be required to correct overstocking problems.

3. The third step involved a breakdown by broad management classes and by ownership of the 26.5 million acres considered suitable for intensive management but where there is an absence of a management stand (table 87). These included a range of types and stocking conditions. The category of farm and miscellaneous private ownerships accounted for a major part of the total, with 20.8 million acres where conversion or regeneration will be necessary to obtain satisfactory yields.

4. The fourth step involved an estimate of current levels of forestry activities to aid in determining additional areas where management might be intensified. These data, based upon estimates of past treatment and disturbance on measured field plots, showed an estimated level of forestry activities in 1970 as follows:

Practice	*Million acres*
Harvesting	1. 7
Intermediate cutting	1. 6
Planting	0. 5
Total	3. 8

These data suggest that for the category of farm and miscellaneous ownerships expected accomplishments over the next decade with current management would leave about 19.6 million acres untreated. The make-up of this area is shown in table 88 and figure 46.

Forest conditions in the southeast, 1970

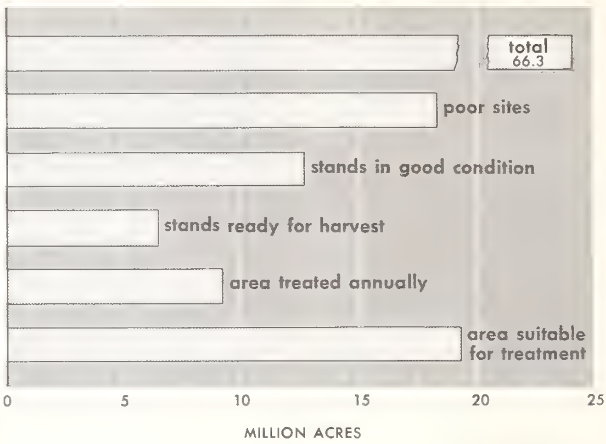

Figure 46

In this detailed analysis for the farm and miscellaneous category of ownership, some 5 million acres of hardwood types were eliminated from detailed study, not because of the unimportance of hardwoods, but rather because of primary concern at this time over supplies of softwood sawtimber.

Estimated Increases in Yields

The potential yields of pine plantations that might be established on areas converted or regenerated vary widely depending upon site, species, density, and age. Forest areas were, therefore, divided into good and medium sites in order to take account of the considerable differences in potential yields attributable to site differences. Areas by site were estimated from Forest Survey plot data, except for idle cropland where it was assumed that half of the acreage available would occur on good sites and half on medium sites.

Available yield tables for slash pine and loblolly pine were utilized in estimating potential increases in harvests after allowances for understocking and losses to destructive agents.

Evaluation of thinning opportunities required taking into account the product objectives of forest landowners. Thus, for pulpwood production many owners select spacings that do not require thinning during the rotation. Others insist that thinning must be financially advantageous, even for pulpwood rotations. On the other hand, in all-purpose management that includes both small and large product objectives, thinnings will of necessity play a role in maintaining stand structure and diameter growth. Also in overstocked stands precommercial thinning may be an important management opportunity.

Estimates of increased future harvests obtainable from thinning treatment were developed by a stand table projection method.

In such growth projections, it was assumed that the current program of prescribed burning would be continued along with other protection activities. Estimated yields necessarily included a substantial allowance for probable losses in plantations and in natural stands from destructive agents such as fire, insects, and disease. Forest Survey findings in this region indicate that mortality losses have been reducing gross growth by an estimated 10 to 12 percent, while other growth losses resulted in additional differences between current growth and potential growth.

TABLE 87.—*Areas in the Southeast suitable for intensive timber management but without manageable stands, by management and ownership classes, 1970*

[Thousand acres]

Management class	All ownerships	Ownership class			
		National Forest	Other public	Forest industry	Farm and miscellaneous private
Idle cropland	2,353. 7	----------	----------	----------	2,353. 7
Nonstocked forest	946. 1	21. 8	45. 8	262. 4	616. 1
Pine plantations [1]	927. 1	40. 9	20. 3	543. 6	322. 3
Natural pine stands	4,710. 2	191. 4	162. 2	885. 3	3,471. 3
Oak-pine stands	4,165. 5	95. 0	157. 4	636. 6	3,276. 5
Upland hardwood stands	7,544. 0	322. 3	187. 3	706. 2	6,328. 2
Bottomland hardwood stands	5,834. 9	37. 0	137. 5	1,239. 8	4,420. 6
Total area	26, 481. 5	708. 4	710. 5	4, 273. 9	20, 788. 7
Percent of total in table 86	28. 7	15. 3	21. 0	24. 0	31. 3

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[1] Estimated acreage in pine plantations with poor survival and plantations severely damaged by fire, insects, disease, etc.

TABLE 88.—*Area of farm and miscellaneous private ownerships in the Southeast suitable for more intensive timber culture, by management and condition class, 1970*

[Thousand acres]

Management class	Condition class	Total area available in 1970	Assumed reduction over next 10 years	Additional opportunity
Idle cropland	Open	2, 353. 7	882. 6	1, 471. 1
Nonstocked forest	do	201. 7	74. 9	126. 8
Do	Occupied	414. 4	153. 8	260. 6
Pine plantations	Mature	27. 6	27. 6	----------
Do	Overstocked	460. 4	396. 3	64. 1
Do	Poorly stocked	322. 3	117. 5	204. 8
Natural pine stands	Mature	2, 180. 6	2, 180. 6	----------
Do	Overstocked	4, 058. 5	3, 493. 8	564. 7
Do	Poorly stocked	3, 471. 3	1, 265. 9	2, 205. 4
Oak-pine stands	Mature	999. 2	999. 2	----------
Do	Overstocked	1, 548. 2	1, 231. 2	317. 0
Do	Poorly stocked	3, 276. 5	164. 7	3, 111. 8
Upland hardwood stands	Mature	1, 882. 1	1, 882. 1	----------
Do	Overstocked	1, 348. 3	1, 149. 7	198. 6
Do	Poorly stocked	6, 328. 2	23. 6	6, 304. 6
Bottomland hardwood stands	Mature	1, 532. 0	1, 532. 0	----------
Do	Overstocked	534. 6	148. 0	386. 6
Do	Poorly stocked	4, 420. 6	----------	4, 420. 6
All classes	----------	35, 360. 2	15, 723. 5	19, 636. 7

In the case of fusiform rust, which is one of the major damaging agents for both loblolly pine and slash pine, the most promising control measure appears to be the development of more resistant planting stock through genetic improvement. Better control of reproduction weevils in pine plantations will also require planting delays or treatment of seedlings with insecticides. Prevention of losses from fomes annosus root rot will require control measures such as chemical treatment of stump surfaces after felling. For the many bark beetles that plague the southern pine, salvage currently appears to be the most practical form of control.

In this initial study it was not possible to adequately evaluate opportunities for control of insects and disease nor of opportunities for intensified fire protection. Impact studies will be needed for each major cause of mortality before it will be possible to measure the economic efficiency of adding to prospective timber supplies through more intensified protection.

In addition to the potential increases in yields through cultural measures as estimated in this study, additonal increases in future timber supplies also might be obtained through more complete utilization of the available timber.

Recent Survey findings indicate that up to 12 percent of the total softwoods and 43 percent of the total hardwoods removed from growing stock are not used for products. If only half this wood fiber could be channelled into use, the annual output of timber products could be increased over 5 percent without any increase in timber removals. Additional volumes might be obtained from rough and rotten trees that are now typically left standing in harvesting operations and even from trees in urban areas.

Other possible actions to improve timber yields beyond the estimates in this analysis include the development of genetically improved planting stock, and application of fertilizer to enhance soil fertility. It is estimated, for example, that genetic gains from first generation stock will average 15 to 20 percent higher volume growth than obtainable with seed from existing stands. Management to put the right species on the right site also could substantially increase future timber harvests.

Costs of Forestry Practices

Average costs of forestry practices assumed in this study for the Southeast are summarized in table 89. On some idle and open areas where extensive site preparation is not required, pine plantations can be established at perhaps half the costs shown in this table. However, a large share of these easy planting opportunities have been exhausted and attention now must be focused largely on those lands that can only be restored through site preparation or type conversion. For most of the area considered in the study it is believed that these costs were fairly representative as of 1970.

Values of Increased Harvests

In addition to the estimates of increased yields possible with intensified management practices and estimated costs of such measures, estimates were developed of the values of increased softwood timber output at 1970 prices, as follows:

Tree diameter	*Cents per cubic foot*
6	7
8	11
10	12
14	15
18	18

TABLE 89.—*Estimated average costs of forestry practices in the Southeast, 1970*

Practice or item	Cost
Establishment of pine plantation on cutover lands:	*Dollars*
Site preparation per acre	28.25
Pine seedlings per thousand	5.25
Insecticide treatment of seedlings for protection against weevils do	.50
Planting per seedling	.02
Total average establishment cost per acre	44.75
Other practices:	
Prescribed burning per acre	2.05
Poisoning undesirable trees do	11.30
Girdling undesirable trees do	9.65
Release cutting of young growth do	15.50
Timber cruising (10 percent) do	.90
Marking trees for harvesting do	3.60

Areas Suitable for Treatment

On farm and miscellaneous private ownerships investment opportunities were identified on some 14.5 million acres. Although amounting to only 20 percent of all forest lands in this ownership category, this estimate may overstate the area on which landowners would be both able and willing to intensify management. There are over 700 thousand private farm and miscellaneous private landowners who collectively own over 70 percent of the land included in this study. For the most part these lands are in small tracts. Tenure is generally short in comparison with the period required for forestry investments to pay out. Lands are owned for a variety of reasons, and responses to forestry programs have been limited.

For such reasons adjustments of "available" areas were made in the national study reported earlier to allow for landowners' indifference to investment opportunities. It is likely that new approaches will have to be devised, and substantial financial incentives made available, before intensified management can be expected on all of the acreage where more intensive forestry practices would yield significant returns.

On forest industry lands in the Southeast, the backlog of poorly stocked stands for conversion, regeneration, or intermediate cutting is much smaller than for farm and miscellaneous private lands. Nevertheless, more than 6 million acres of industrial lands were in these categories in 1970 (table 87). One might assume that management on industrial holdings will be further intensified over time in view of the major progress made to date, but economic considerations may well prevent realization of all investment opportunities.

National Forests and other publicly owned lands are of much smaller importance in the Southeast and areas suitable for intensification are correspondingly limited. Also, the primary objective of management of these lands is not to maximize volumes of timber or timber-growing profits but rather to produce a variety of outputs under multiple-use management. On other public lands in military installations or in local government holdings, some intensive timber management is found but a diversity of land management objectives limits efforts to accelerate timber culture. In this initial study public lands as well as industry lands were excluded from detailed analysis.

Rates of Return on Investments

Rates of return from specified practices were calculated in turn from data on costs, yields, and values. A listing of treatment opportunities ranked in order of rates of return is presented in table 90 for farm and miscellaneous private lands in the Southeast.

Results of this study indicated that of the 8 million acres of land in farm and miscellaneous holdings classified as having intermediate cutting opportunities and the 19.6 million acres where regeneration is needed to increase productivity, investments in intensified management would return more than 5.0 percent on some 8.1 million acres suitable for growing pine. With a 4-percent minimum rate of return, an estimated 14.5 million acres would be suitable for intensification.

Short rotations of 30 years were assumed in this analysis in calculating yields and rates of return. Increases in mean annual increment of pine resulting from added forestry investments and 30-year rotations were estimated at about 1.3 billion cubic feet, including 1.6 billion board feet of sawtimber (table 90). The cost of such a program at 1970 price levels was estimated at $724 million, or an average of about $50 per acre.

If such a program were spread over a 10-year period it would involve more than a doubling of the 1970 rate of timber cultural practices within the farm and miscellaneous private ownership class. The higher the goal the more likely that available labor, equipment, planting stock, or number of cooperating landowners would become limiting factors. Implementation of any major program for this owner category also would undoubtedly require some form of cost-sharing arrangement or other incentives to help motivate the landowners involved.

Because timing of yields is of critical importance, potential increases in softwood timber harvests from the farm and miscellaneous private class are shown in table 91 by the decade when such increased cuts are estimated to occur. These projections indicate very limited opportunity for increasing cuts during the first decade or two. In the third decade increases in yield are estimated at 1.3 billion cubic feet, including 1.6 billion board feet of sawtimber. This would represent an increase of 48 percent above the projection of available softwood harvests under 1970 levels of management shown in table 85.

It is apparent from this analysis that identifying opportunities for increasing prospective timber supplies requires a wide range of input data that involves most forestry disciplines. Essential inputs include a reasonably accurate measure of the

TABLE 90.—*Areas, costs, and increased yields from intensified management on farm and miscellaneous private lands in the Southeast, by estimated rate of return on investments*

Management class	Treatment	Rate return [1]	Area		Cumulative cost totals	Cumulative increase in annual volume of pine harvests	
			By class	Cumulative		Growing stock	Sawtimber
		Percent	*Thousand acres*	*Thousand acres*	*Million dollars*	*Million cu. ft.*	*Million bd. ft.*
Pine plantations	Commercial thin	∞	27	27	0.2	1	4
Natural pine stands	do	∞	429	456	4.6	20	53
Pine plantations	Precommercial thin	7.8	37	493	5.0	21	56
Nonstocked forest	Planting	7.8	127	620	8.4	32	72
Idle cropland	do	7.3	1,471	2,091	39.6	141	252
Natural pine stands	Conversion	7.1	2,205	4,297	153.4	323	469
Pine plantations	do	6.9	205	4,501	158.8	340	476
Oak-pine stands	TSI	6.7	139	4,640	161.7	345	483
Natural pine stands	Precommercial thin	6.3	136	4,776	164.9	349	497
Oak-pine stands	Conversion	6.3	3,112	7,887	334.8	655	768
Nonstocked forest	do	5.7	261	8,148	348.2	681	801
Upland hardwood stands	do	4.0	6,305	14,453	723.9	1,319	1,552
Oak-pine stands	Commercial thin	Negative	178	14,631	727.2	1,320	1,564

[1] Within each management class rates of return vary above or below these averages, depending on local factors influencing costs or yields.

TABLE 91.—*Projected softwood timber supplies from farm and miscellaneous private ownerships in the Southeast, with different levels of management*

TOTAL GROWING STOCK (MILLION CUBIC FEET)

Level of management	1970	Projected annual removals		
		First decade	Second decade	Third decade
1970 level	1,348	1,513	1,721	1,866
Intensified [1]	1,348	1,533	1,751	3,185

SAWTIMBER (MILLION BOARD FEET)

Level of management	1970	First decade	Second decade	Third decade
1970 level	4,262	4,847	5,464	5,974
Intensified [1]	4,262	4,899	5,540	7,526

[1] Includes treatment of an additional 14.5 million acres over the next 10 years where the treatment opportunities promise a 4.0 percent or better rate of return on the investments. Annual costs of treating these additional acres are estimated to total $72.4 million.

extent, condition, and productive capability of the land, together with prospective yields of timber and related forest values—under both current and intensified management. Procedures must provide for development of criteria for identifying and ranking opportunities for increasing yields, including specific treatment opportunities, estimated costs of implementing treatments and the likely response in terms of added volume and value.

Although the procedures as presented herein suggest a ranking of opportunities on the basis of economic efficiency, policy makers also may need to interject social, environmental, or other considerations in developing management and utilization programs.

AN EXAMPLE OF POTENTIALS FOR INTENSIFIED FOREST MANAGEMENT IN THE NORTHEAST REGION

Approximately 28 percent of the commercial timberland in the Northeast is in the oak-hickory type, and 23 percent in the maple-beech-birch type. Because of the substantial acreage covered by these two hardwood types, 42 million acres, they were selected for detailed evaluation of intensified management. This does not imply, however, that other forest types in the Northeast present no opportunities for intensified management. Farm and miscellaneous private owners hold about 85 percent of the oak-hickory type and over 70 percent of the maple-beech-birch type.

Specific areas within the region where recent data were available were first selected for detailed analysis and case study results then extrapolated to the region. Opportunities in the oak-hickory type were analyzed in southeastern Ohio. The maple-beech-birch type was studied in Maine. Evaluation procedures are outlined below in some detail for the oak-hickory case. The same general approach was used in the maple-beech-birch case study.

Designation of Management Classes

Since the 2.3 million acres of oak-hickory type in southeastern Ohio contain a broad continuum of stand conditions, the area was first divided into relatively homogenous cells, based upon a classification of 680 Forest Survey plots measured in 1968. Each plot was placed in a matrix according to six basal area classes, three tree stocking levels, two average diameter classes, and five site productivity classes. Based upon this classification, 77 distinct "management classes" were identified.

Individual management classes entailing less than 15 thousand acres were excluded from further analysis because of large sampling errors. Management classes of site productivity below 50 cubic feet per acre per year of potential growth also were dropped because of low potential returns. These exclusions left 36 management classes for detailed study, aggregating approximately 1.8 million acres.

Stand profiles.—As a basis for in-depth evaluation of intensified treatments, more detailed stand profiles than used for management class identification were then developed for the 36 management classes retained for study. Information was compiled on numbers of trees per acre by species group, tree quality and diameter class, using Forest Survey plot records.

Stocking classes.—The 36 management classes were all classified into one of three stocking classes specified in a "1972 Timber Management Guide for Upland Central Hardwoods." [6]

Stocking classes in each management class were based on stocking of "acceptable" trees according to the formula:

$$S=0.00507N+0.01698\,D+0.00317\,D^2$$

where

S=level of stocking with acceptable trees

N=number of acceptable trees

D=diameter acceptable trees.

Management strategies.—Strategies for stands in each of the 36 management classes were based upon the objective of growing the most high-quality sawtimber the site could produce in the shortest reasonable time. Given this objective two broad treatment regimes were assigned to 23 of the 36 management classes, based upon the acceptable tree stocking levels.

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[6] USDA Forest Service, Central States Forest Experiment Station and North Central Region. 1972 Timber management guide for upland central hardwoods. 33 p. 1972.

Nine of these 23 management classes had insufficient stocking levels to fully utilize their sites for several years to come. The intensified management regimes prescribed for these areas entailed an immediate regeneration harvest, stand reestablishment to oak-hickory, stand cleaning at an early age, periodic thinning to promote rapid sawtimber growth, and final harvest. About 24 percent of the 1.8 million acres analyzed in the case study area, or 424 thousand acres, fell into this stocking class and treatment regime.

Fourteen management classes had excess stocking. The intensified management regime specified for these stands entailed an improvement cut to get stocking down to a desirable level, followed by periodic thinnings and final harvest. These classes contained 46 percent of the 1.8 million study acres, or 827 thousand acres.

Thirteen management classes were judged to have sufficient stocking of acceptable trees for the next 10 years, and were not assigned an intensified management regime. These covered 31 percent of the study group, or 551 thousand acres.

Projecting Stand Development

Increased yields from intensification of management were estimated by simulating stand development under both current and intensified management, using growth models developed by Timber Management Research. Projected growth and harvests under intensified management were estimated by applying the prescriptions described above. Projected harvests under current management were estimated by applying 1970 removal rates by diameter class to the inventory in Ohio and holding this constant over the projection period (table 92). These were average removal rates and did not provide for specific treatment schedules as in the intensified regimes, but are believed to provide a good proxy for results of current management.

Average diameters were employed as measures of stand maturity in the analysis of intensified management. These varied according to site class (potential cubic feet per acre per year) as follows:

Site class	*Average diameter at maturity (inches)*
50–59	12
60–69	15
70–79	18
80 plus	21

In the simulation of stand development residual stands of trees were left after thinnings in both management regimes. The current management regime left stands with more small diameter trees than in the case of intensified management.

TABLE 92.—*Projected inventories, growth, and removals with continuation of 1970 management and cutting practices in oak-hickory stands of the Northeast, and values at alternative price levels*

Decade	Inventory at beginning of decade	Decadal growth	Decadal removals	
			Volume	Value
	Million cords	*Million cords*	*Million cords*	*Million dollars*
1st	481.0	159.2	109.6	[1]1007 [2]1856
2d	530.6	208.9	109.6	[1]1007 [2]1856
3d	629.9	190.9	109.6	[1]1007 [2]1856
4th	711.2	227.6	109.6	[1]1007 [2]1856
5th	829.2	115.9	109.6	[1]1007 [2]1856
6th	835.5			

[1] With 1970 prices and costs.

[2] With a 30% increase in prices of lumber and allocation of 75% of the increase to stumpage, a $5 per cord increase in prices of pulpwood stumpage, and 1970 management costs.

Treatment costs.—Estimated costs of intensified management included costs of removing nonmerchantable trees in regeneration cuts, improvement cuts, and precommercial cleanings. Any cut producing less than 5 cords per acre was assumed to be unmerchantable.

Costs for removing trees in stand conversions and cost of improvement cuts were based upon an equation using numbers and diameter of trees removed, along with other input costs. Costs of stand conversion ranged from $10–$20 and averaged about $15 per acre. Costs of improvement cutting ranged from $14–$28 and averaged about $19 per acre. Costs of precommercial cleanings averaged $21.50 per acre.

Stumpage values.—Values of timber harvested in future thinnings and final harvest cuts were calculated by a conversion surplus procedure similar to that employed on National Forests in timber appraisals. The saw-log portions of growing stock trees were valued by diameter class based on the price of 4/4 lumber that could be produced, minus all costs necessary to convert stumpage to lumber. These timber values were adjusted to account for variations in lumber quality and costs resulting from differences in species mix, site productivity, and management intensity. Timber sale price differences have been demonstrated to be associated with such stand characteristics.[7]

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[7] See, for example: Anderson, Walter C. Pine sawtimber price behavior in South Carolina. USDA Forest Serv., Res. Pap. SO–42, 12 p. 1969.

Saw-log values in the oak-hickory study ranged from $6 to $160 per thousand board feet. Typical examples of how prices varied by diameter, stocking class, and site index are as follows:

Diameter	Species [1]	Site index	Dollars per thousand board feet
12	A	55	15
16	B	65	27
18	C	75	35
20	A	80+	95
24	B	55	74
28	C	65	92

[1] A=Yellow-poplar and black walnut
B=Red oak and ash
C=Other species.

An alternative value assumption was also employed in evaluating the economic feasibility of intensified management. Cordwood prices were raised $5.00 per cord and saw-log prices were raised 75 percent. This adjustment roughly corresponded to a 30-percent increase in final product prices.

Increases in timber values from management intensification included both the value of increased intermediate thinnings and increased values of residual stands at the end of 50 years. The total increases in value were compared with costs of intensified management in evaluating the economic potentials for intensification.

Economic evaluation of intensification.—The economic feasibility of undertaking intensified management was evaluated using present net worth and benefit/cost calculations, both of which gave the same results. Benefits and cost schedules over time were discounted at 5 percent. Any opportunity which had a positive present net worth thus had an internal rate of return in excess of 5 percent and a benefit/cost ratio in excess of 1.0. The 5 percent rate provides comparability between this and other case studies. This is not implied that 5 percent is necessarily the most appropriate selection-rejection level.

Opportunities with 1970 stumpage prices.—Under the 1970 price assumption, investments in 9 of the 23 management classes for intensified management would return over 5 percent. Six of these entailed treatments starting with immediate stand replacement. Three involved initial improvement cutting to change stand composition.

The increase in present net worth per acre due to intensification averaged $34.14 for the regeneration treatment on 219,000 acres in the pilot area, at an average cost of $27.32 per acre. For the stand improvement opportunities, the average increase in present net worth was $12.56 on 168,000 acres. The average cost was $17.22 per acre.

Opportunities with the higher price assumption.—Use of higher price levels resulted in the addition of only two management classes, both entailing regeneration treatments. Use of the higher price levels raised the acreage economically treatable in the pilot area by 37 percent, or 145 thousand acres.

Present net worth per acre was more sensitive to price changes. With the higher price assumption, present net worth for regeneration treatments was $62.91 per acre, or 84 percent higher than with 1970 prices. The average increase in present net worth from stand improvement treatment was $31.84 per acre, or 153 percent higher than with 1970 prices.

Regional Expansion of the Oak-Hickory Pilot Study

The results of the southeastern Ohio case study were expanded to the Northeast region by the ratio between the oak-hickory acreage in the pilot area (2.3 million acres) and the oak-hickory acreage in the region (35.3 million acres). Such extrapolations must be used with caution, however, because they assume costs, prices, yield increases, and other factors applying in the pilot areas are also applicable regionwide. They also assume that the region contains the same proportions of area in the various "management classes" found in the pilot area. It is believed, however, that they provide a reasonable initial indication of management opportunities.

Opportunities with 1970 stumpage prices.—Accomplishment of intensified management in oak-hickory types in the Northeast, including opportunities that return 5 percent or more at 1970 prices, would cover roughly 6.0 million acres at a cost of $165 million, or $27.40 per acre (table 93). This intensification would lower timber inventories at the beginning of the sixth decade by 36 million cords, or 4 percent, below the inventory expected with current management as shown in table 92. The stumpage value of this residual inventory would be increased a substantial 34 percent through management intensification by concentrating growth on larger and higher quality trees of desirable species.

Projected decadal growth with intensified management fluctuates about the current growth level. In the fourth decade projected growth is 27 percent lower than with current management, but in the fifth decade is 40 percent higher.

Increases in timber removals over the five decade period due to intensification total 56.3 million cords, or 10 percent more than expected with current management. Just as with inventory estimates, however, a greater impact registers in the value of removals, which would be $991 million, or 20 percent higher under intensified management. Physical volumes are increased by intensification but an even greater effect arises from harvesting of larger and higher quality trees.

Opportunities with higher stumpage price assumptions.—Similar results occur when opportunities are undertaken which return 5 percent under the assumed higher price levels. Intensified

TABLE 93.—*Net changes in inventories, growth, and removals with intensified management of oak-hickory stands in the Northeast (1970 product prices)*[1]

Decade	Change in inventory at beginning of decade	Change in decadal growth	Change in decadal removals		Increase in decadal treatment cost
			Volume	Value	
	Million cords	*Million cords*	*Million cords*	*Million dollars*	*Million dollars*
1st	----------	13. 3	10. 8	52	92. 2
2d	2. 5	5. 1	−7. 1	−97	72. 4
3d	14. 7	17. 6	0. 5	−28	----------
4th	31. 8	−62. 5	−2. 3	−92	----------
5th	−28. 4	46. 7	54. 4	1156	----------
6th	−36. 1	----------	----------	----------	----------

[1] Including 9 intensified management opportunities on 6.0 million acres that would return more than 5 percent on investments in intensified management.

treatment would be economic on 8.8 million acres, at a cost of $258 million, or $29 per acre (table 94). Inventory volumes at the beginning of the sixth decade would be reduced below the current management level by 29 million cords, or slightly less than the reduction under the 1970 price assumption. The value of the inventory, however, would be 40 percent greater. Growth under intensified management would be slightly higher, 7.3 percent, than with current management.

The total increase in available removals with intensified management would be 95 million cords over five decades, or a 17 percent increase. The value of removals would exceed values with current management by $2110 million, or 23 percent. This would be slightly more than the 20 percent increase in values with intensified management under the 1970 price assumptions.

Maple-Beech-Birch Pilot Study

The procedural steps involved in the Maine pilot study of maple-beech-birch were essentially the same as those for the oak-hickory case. Selection of management classes for economic evaluation was based upon a comparison of current conditions with a desirable stocking guide. This led to identification of four opportunities covering 957 thousand acres, or 27 percent of the maple-beech-birch type in Maine. The site index was above 55 for all four situations; the average diameter of all four situations was from 3 to 5 inches. Basal areas fell into two classes, 80–99 and 100–119 square feet. Percentage stocking of yellow birch was identified as either above or below 10 percent.

The intensified management strategy for all classes included an immediate stand improvement cut, subsequent thinnings, and final harvest 80–87 years from initial treatment. All four opportunities would return over 5 percent on treatment costs under both price assumptions. The average increase in present net worth per acre due to intensification was estimated at $54 at 1970 prices, and $110 at the higher price level.

Results from the Maine pilot area were expanded to the entire Northeast region on the basis of the maple-beech-birch acreages in the two areas. Estimated impacts on regional inventories, net growth, and removals were very similar to

TABLE 94.—*Net changes in inventories, growth, and removals with intensified management of oak-hickory stands in the Northeast (1970 prices plus 30 percent)*[1] [2]

Decade	Change in inventory at beginning of decade	Change in decadal growth	Change in decadal removals		Increase in decadal treatment cost
			Volume	Value	
	Million cords	*Million cords*	*Million cords*	*Million dollars*	*Million dollars*
1st	----------	3. 7	14. 1	66	138. 2
2d	−10. 4	17. 1	−6. 7	−177	120. 2
3d	13. 4	35. 0	4. 0	−25	----------
4th	44. 4	−49. 6	19. 8	141	----------
5th	−25. 0	59. 7	63. 8	2, 110	----------
6th	−29. 1	----------	----------	----------	----------

[1] Including 12 intensified management opportunities on 8.8 million acres that would return more than 5 percent on investments in intensified management.

[2] Sawtimber prices raised 75 percent of a 30 percent increase in lumber prices; and pulpwood prices raised $5 per cord over 1970 levels.

TABLE 95.—*Net change in inventories, growth, and removals with intensified management of maple-beech stands in the Northeast (1970 prices)*[1]

Decade	Change in inventory at beginning of decade	Change in decadal growth	Change in decadal removals		Increase in decadal treatment cost
			Volume	Value	
	Million cords	*Million cords*	*Million cords*	*Million dollars*	*Million dollars*
1st	--------	18.0	50.4	[2] 123 [3] 231	74.8
2d	−32.4	22.1	−16.3	−237 −421	--------
3d	6.0	25.0	50.2	790 1,414	46.1
4th	−18.2	25.7	−16.3	−237 −421	--------
5th	22.8	13.6	28.6	969 1,724	--------
6th	7.8	--------	--------	--------	--------

[1] Includes 4 intensified management opportunities on 5.7 million acres.

[2] With 1970 prices and costs.

[3] With a 30 percent increase in the base price of lumber and allocation of 75 percent of the increase to stumpage, a $5 per cord increase in prices of pulpwood stumpage, and 1970 management costs.

those resulting from management intensification in oak-hickory stands.

An estimated 5.7 million acres of maple-beech-birch in the region were identified as economically suitable for stand improvement treatments at an average cost of $21.20 per acre (table 95). With intensification, inventories at the beginning of the sixth decade would be almost 8 million cords greater than with current management, and values of the residual inventory would be $1.7 billion more than with current management. Growth would be over 100 million cords greater with intensified management than with current management. Estimated increases in removals with intensified management total 96.6 million cords over five decades, valued at $1.4 billion at 1970 prices.

AN EXAMPLE OF POTENTIALS FOR INTENSIFIED FOREST MANAGEMENT IN THE NORTH CENTRAL REGION

Detailed per acre evaluation of intensified management opportunities were undertaken for three pilot areas: northeastern Wisconsin, southern Indiana and Illinois, and southern Missouri. These areas contain forest situations believed typical of the predominantly hardwood forests of this region. The case study areas collectively covered 11 million acres, or 12 percent of the total area of 96 million acres of commercial timberland in the region.

Estimates of opportunities for intensified forest management presented below indicate that with a 5 percent rate of return criterion, and 1970 price levels plus 30 percent, about 6.2 million acres in the region would be economically suitable for intensified silvicultural treatment. Increased harvests resulting from intensified management of these acres would total about 13.9 billion board feet of sawtimber, including 12.3 billion board feet of softwood, plus 4.4 billion cubic feet of pulpwood, over the next 50 years.

Selection of Areas for Analysis of Treatments

Inclusion of individual areas for detailed evaluation of potentials for intensification was based primarily upon current stocking, current species dominance, suitability for planting alternative species, site class, and size of area in the opportunity class.

Based upon these screening factors, a number of possible situations were excluded from analysis. Thus options on low sites were not considered, e.g., planting red pine on nonstocked forest land on site classes less than 50. Commercial thinning of pine plantations was excluded because of the limited area involved. Similarly, maple-beech-birch stands which already had desirable stocking levels [8] were excluded from this evaluation.

This screening process left for analysis areas where management intensification appeared likely to have major impacts upon timber supplies in the pilot areas and return more than 5 percent on treatment costs. These included:

(1) Situations having relatively high site productivity but poor or nonexistent stocking and apparently suitable for reforestation with softwoods such as red pine and white pine. These included both areas of idle cropland indicated

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[8] Arbogast, Carl, Jr. Marking guides for northern hardwoods under the selection system. USDA Forest Serv., Lake States Forest Exp. Sta., Sta. Pap. 56, 20 p., illus. St. Paul, Minn. 1957.

by the USDA Conservation Needs Inventory and areas of nonstocked land in Wisconsin of site class 50 and better. These softwood planting situations all entailed a schedule of thinnings prior to final harvest.

(2) Situations in northern hardwood stands on productive sites where stand characteristics indicated favorable responses to cull tree removal or improvement cutting, and a source of thinnings in poletimber and sawtimber stands. These were designed to adjust stocking to an "ideal" of 87 square feet per acre.

(3) Site preparation for natural regeneration of aspen in recently harvested stands.

Yields, Prices, and Costs

Yields of natural forests to be expected with current management, as in other regions, were assumed to be represented by Forest Survey plot information. Yield estimates for more intensively managed stands were derived from Forest Survey plot information and published yield tables, or in the case of hardwood treatments from a growth simulator.[9] Documented yield information for both current and intensified management is scanty and had to be augmented by generous applications of judgment. No estimates were prepared regarding the net impact upon nontimber resources and uses.

Stumpage prices were derived from reports of recent timber sales adjusted to approximate 1970 price levels. Estimates of National Forest stumpage prices were used for shortleaf pine.

A second set of stumpage prices employed in this analysis assumed timber product prices 30 percent above 1970 levels, with an estimated 75 percent of the increase in products prices assumed to go to stumpage. This roughly doubled most 1970 stumpage prices.

Estimated treatment costs were based largely on Forest Service contract experience [10] and special local studies.

The estimates of yields, costs, and stumpage returns with current and intensified management of the selected situations were then evaluated to sort out those that promised to return more than 5 percent on increased investments, both at 1970 timber product prices and at 1970 prices plus 30 percent.

It is recognized that the forest situations selected for detailed study were not necessarily the only management intensification opportunities which would return 5 percent or more. Some may have been omitted in the screening process. Also, the input data used in this analysis are subject to considerable uncertainty.

Regional Estimates of Management Opportunities at 1970 Prices

Once the evaluations of opportunities in the pilot areas were analyzed on a per-acre basis, results were generalized to the North Central Region on the basis of total estimated areas of each type of situation. This area expansion, although based on area stratifications such as shown in table 45 of Appendix I, involved considerable judgment. It was assumed that the yield, price, and cost estimates used in the analysis for pilot areas, and therefore present net worths at a 5-percent discount rate, would apply across the entire region. These regionwide extrapolations also assumed that all areas meeting the 5-percent criterion would be available for intensification, regardless of tract size or owner objectives.

Plantations.—At 1970 prices and costs, about 160 thousand acres of softwood planting in the next decade would yield 5-percent or more return on planting and thinning investments (table 96). Estimated costs of intensified management were estimated at $7.3 million, or $45.60 per acre.

The softwood sawtimber harvest increases resulting from a 10-year program of accelerated planting would be minimal until the 4th decade when projected increases in available harvests reach 53 million board feet annually. In the 8th decade a single 10-year program would produce estimated final harvest increases of 567 million board feet annually. This would provide a harvest double the 1970 level of softwood sawtimber output of 539 million board feet from all ownerships in the North Central Region.

Site preparation.—Investments in site preparation of aspen areas would return 5 percent on an estimated 654 thousand acres in the region at a cost of $3.4 million, or $5.20 per acre. The pulpwood harvest increase due to this treatment was estimated at 130 million cubic feet per year in the 5th decade.

Stand improvement.—Improvement of northern hardwood stands would return 5 percent at 1970 prices on an estimated 701 thousand acres at a cost of $9.1 million, or $13 per acre. The net effect upon hardwood sawtimber output would be small until the 6th decade when projected increases in harvests average 344 million board feet annually. This would be an increase of approximately 10 percent above the 1970 regional output of hardwood roundwood of 3.28 billion board feet.

Regional Estimates of Opportunities at Higher Prices

Under the assumption that future stumpage prices would be about double the 1970 level, the estimate of areas that could be treated with a criterion of 5 percent return on investment rose sharply from 1.5 million to 6.3 million acres (table 97). Four additional softwood planting situations were added, including planting nonstocked forest

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[9] Skog, K. E., and R. A. Leary. A computer simulator of northern hardwood forest stand growth and management.

[10] Row, Clark. Silvicultural service contract cost study; FY 1970. USDA Forest Serv., Econ. and Mark. Res., Washington, D.C., preliminary report. August 8, 1971.

TABLE 96.—*Intensified management opportunities in the North Central Region which return 5 percent or more (1970 timber prices)*

Treatment situation	Area	Cost	Harvest change within the decade													
			Sawtimber								Pulpwood					
			1st	2d	3d	4th	5th	6th	7th	8th	1st	2d	3d	4th	5th	6th
	Thousand acres	*Million dollars*	*Million bd. ft.*	*Million bd. ft.*	*Million bd. ft.*	*Million bd. ft.*	*Million bd. ft.*	*Million bd. ft.*	*Million bd. ft.*	*Million bd. ft.*	*Million cu. ft.*	*Million cu. ft.*	*Million cu. ft.*	*Million cu. ft.*	*Million cu. ft.*	*Million cu. ft.*
Planting pines:																
White pine on open land	112	6.2			78	470	974	1,266	683	4,760						
Shortleaf pine on open land	48	1.1				77	91	106	120	912				19		
Total	160	7.3			78	547	1,065	1,372	803	5,672				19		
Site preparation: For natural regeneration of aspen	654	3.4													1,293	
Stand improvement for maple-beech-birch:																
Cull removal in poletimber	317	4.1	−190	198	134	32	279	2,027			−42	−30	6	−20	−6	−1
Cull removal in sawtimber	19	0.2	−19	9	8	4	0	136			−1	−3				−1
Improvement cut in poletimber	182	2.4	−46	110	83	−106	128	741			−1	−9	0	−4	−17	−35
Precommercial thin in poletimber	183	2.4	−96	89	112	112	201	537			8	−5	−23	−14	−27	−24
Total	701	9.1	−351	406	337	42	608	3,441			−36	−47	−17	−38	−50	−61
All treatments	1,515	19.8	−351	406	415	589	1,673	4,813	803	5,672	−36	−47	−17	−19	1,243	−61

TABLE 97.—*Intensified management opportunities in the North Central Region which return 5 percent or more (1970 timber prices plus 30 percent)*[1]

Treatment situation	Area	Cost	Harvest change within the decade													
			Sawtimber								Pulpwood					
			1st	2d	3d	4th	5th	6th	7th	8th	1st	2d	3d	4th	5th	6th
	Thousand acres	*Million dollars*	*Million bd. ft.*	*Million bd. ft.*	*Million bd. ft.*	*Million bd. ft.*	*Million bd. ft.*	*Million bd. ft.*	*Million bd. ft.*	*Million bd. ft.*	*Million cu. ft.*	*Million cu. ft.*	*Million cu. ft.*	*Million cu. ft.*	*Million cu. ft.*	*Million cu. ft.*
Planting pines:																
White pine on open land	112	6.2			78	470	974	1,266	683	4,760						
Shortleaf on open land	48	1.1				77	91	106	120	912				19		
Red pine on open land	632	42.3					2,275	3,097	3,792	12,261			158	158	202	
Red pine on nonstocked forest land	650	44.0					2,320	3,165	3,920	12,630				397	117	
Shortleaf on nonstocked forest land	600	26.0				960	1,140	1,320	1,500	11,400				240		
Convert aspen-birch and plant red pine	1,086	101.0					3,910	5,321	6,516	21,068			272	272	−86	
Total	3,128	220.6			78	1,507	10,710	14,275	16,531	63,031			430	1,086	233	
Site preparation:																
For natural regeneration of aspen	1,794	9.3													2,949	
Stand improvement for maple-beech-birch:																
Cull removal in poletimber	424	5.5	−234	246	167	39	346	2,606			−52	−38	8	−25	−8	−1
Cull removal in sawtimber	143	1.9	−84	41	38	18	3	607			−6	−12	−2			−4
Improvement cut in poletimber	308	4.0	−62	152	115	−145	177	1,021			−1	−13		−6	−23	−48
Precommercial thin in poletimber	456	5.9	−180	167	213	213	379	1,015			15	−9	−43	−26	−50	−45
Total	1,331	17.3	−560	606	533	125	905	5,249			−44	−72	−37	−57	−81	−98
All treatments	6,253	247.2	−560	606	611	1,632	11,615	19,524	16,531	63,031	−44	−72	393	1,029	3,101	−98

[1] With sawtimber prices corresponding to 75 percent of a 30 percent increase in lumber prices, and pulpwood prices raised $5 per cubic foot.

land and conversion of aspen-birch. Site preparation and stand improvement areas also were expanded.

Planting.—Softwood planting opportunities at the higher price level were estimated to cover nearly five times more area than with 1970 prices. Projected harvest increases due to intensification include over 1.0 billion board feet annually of softwood sawtimber by the fifth decade, and 6.3 billion board feet annually during the eighth decade, plus additional volumes of pulpwood size material.

These estimated increases in softwood harvests over the next eight decades are 11 times greater with the higher price assumption than with 1970 prices. However, estimated costs of the larger program with the higher price assumption are 30 times greater than the program included with 1970 prices.

Site preparation.—Aspen site preparation was estimated to be feasible on almost three times more area than with 1970 prices. Projected harvest increases totaled about 300 million cubic feet per year in the fifth decade.

Marginal sites for such treatments as aspen site preparation proved to be sensitive to stumpage price and treatment cost assumptions. Thus an increase of a dollar a cord in aspen stumpage prices had the effect of nearly doubling treatable areas. On the other hand, a rise in treatment costs from about $5 to $10 per acre would largely eliminate aspen site preparation at 1970 prices and a 5-percent discount rate.

Stand improvement.—Estimates of increased harvests of hardwood sawtimber reach 525 million board feet annually by the sixth decade, or 56 percent above increases estimated to be economically possible with 1970 price levels.

Limitations of Current Study

Additional research will be necessary to refine these initial estimates of management opportunities and reduce uncertainties. Projected increases in timber harvests due to treatment were estimated from limited growth and yield data based upon individual plot studies rather than large-scale treatments. Although yields were reduced to allow for this, the reduction factor used (generally about 20 percent) was necessarily based on judgment. Prices and costs were available only from local sources and may not be applicable to all areas and ownerships in the region. Estimates of acres suitable for treatment also must be regarded as preliminary.

In addition, rates of adoption of economically feasible treatments by various owner classes are unknown, and all the acres economically suitable for treatment are not likely to be treated. In addition to problems of financing forestry improvements, treatments such as site preparation or elimination of rough and rotten trees in northern hardwood stands may conflict with other objectives such as wildlife management.

For this reason the estimates in this case study show considerably larger areas economically suitable for treatment than were included in the national study described earlier; in that analysis acreages were reduced for such factors as size and location of tracts, availability of forestry labor and facilities, and willingness of owners to respond to forestry assistance programs.

AN EXAMPLE OF INTENSIFIED MANAGEMENT POTENTIALS IN WASHINGTON, OREGON, AND CALIFORNIA

In this analysis economic potentials for intensified management were analyzed for public ownerships other than National Forests, for forest industry lands, and for other private lands in the States of Washington, Oregon, and California. These 3 classes of forest ownerships included some 35.1 million acres of commercial timberland in 1970, including 8.1 million acres in other public ownerships, 12.2 million acres in forest industry holdings, and 14.8 million acres in other private holdings.

Timber harvests on these lands in 1970 amounted to 16.6 billion board feet, or 65 percent of the total sawtimber output on the Pacific Coast. The "base" projections of future timber harvests with 1970 levels of management, summarized in Chapter II, indicate a drop in prospective sawtimber harvests on these lands to 14.7 billion board feet by 1980, and to 11.8 billion board feet by the year 2000. The estimates developed in this study indicate that with higher timber prices substantial increases in these harvests would be economically feasible.

Area Classification

Forest types considered in this analysis included: (1) Douglas-fir, western hemlock, and Sitka spruce in western Oregon and Washington and northwest California, (2) ponderosa pine in eastern Oregon and Washington and the interior of California, and (3) lodgepole pine in eastern Washington, Oregon, and California. It was not considered possible to make a reasonable analysis of opportunities for management intensification in other types because of absence of yield tables or limited acreages of conditions suitable for management intensification.

Westside conifer stands were first stratified in terms of site productivity classes, stand age, stocking, and numbers of trees per acre.

In order for westside conifer stands to be considered suitable for treatment they had to meet certain requirements as follows:

Treatment	*Stand age*	*Stocking*	*Trees per acre*
Commercial thinning	35–75	More than 70 percent	------
Precommercial thinning	15–25	More than 30 percent	450
Fertilization	Stands qualifying for precommercial or commercial thinning		

For ponderosa pine and lodgepole pine stands, the area classification shown in table 48 of Appendix I was evaluated on a judgment basis to determine areas most suitable for management.

Management Practices Considered

For each of the areas selected as indicated above, management regimes were evaluated to determine practices and areas that would produce at least 5 percent return on investments in intensified management. These included:

1. Westside conifer stands
   a. Commercial thinning of stands at ages 30 through 70
   b. Precommercial thinning of 15-year-old stands, followed by commercial thinning
   c. Fertilization and commercial thinning of stands of ages 30 through 70
   d. Precommercial thinning of 15-year-old stands, followed with fertilization and commercial thinning
   e. Conversion of hardwood stands to Douglas-fir
   f. Planting of nonstocked areas following harvest
   g. Planting of nonstocked areas with genetically superior stock following harvest
2. Ponderosa pine
   a. Commercial thinnings of small sawtimber stands
   b. Precommercial thinnings of 15-year-old and stagnated stands, followed with commercial thinnings
3. Lodgepole pine
   a. Precommercial thinning of 15-year-old stands and stagnated stands, followed with commercial thinnings.

In some cases current management was limited to protection from fire, insects, and disease. In other cases significant areas were already being treated according to these management prescriptions. These acres already being treated were subtracted in estimating areas available for management intensification.

Yield Assumptions

The yield estimates used in this analysis included data for expected harvests with 1970 levels of management, and increases in harvests possible with intensified management. These yield estimates were based upon available yield tables and judgments of timber management research specialists. Allowances were made for anticipated impacts of insects and diseases in both managed and unmanaged stands. Estimated yields of westside conifers also were reduced to reflect discontinuities in forest cover that exist within the commercial forest land area. This reduction was assumed to be 15 percent for all sites and areas.

Increases in future harvests were determined by subtracting per-acre yields with ongoing programs from per-acre yields with intensified management and multiplying the increase by the appropriate number of acres. For public owners it was also assumed that allowable cut procedures will result in scheduling harvests in approximate line with increases in growth. This allowable cut effect was used to portray harvest increases but was not considered in calculating rate of return. The harvest available from individual treated acres was used in rate of return calculations.

Cost Assumptions

Costs of intensified management as of 1970 were derived from a number of public and private sources in the Pacific Northwest. Assumed per-acre costs averaged as follows:

a. Planting westside conifers following harvest—$35
b. Precommercial thinning—$50
c. Commercial thinning (netted out of price)
d. Fertilization—$22
e. Site preparation for conversion of hardwood stands less than 45 years of age—$40

Price Assumptions

Two price assumptions were used in evaluation of the increased yields obtainable with intensified management—one based on National Forest timber sales in 1970, with the second assuming a steady rise to 2020 at a compound rate of 1.5 percent annually in product prices, with 75 percent of the increase going to stumpage. Data in terms of Scribner log scale, primarily for old-growth timber, were converted to prices for second-growth timber in terms of International ¼-inch log rule. This resulted in the following prices:

	1970 prices per MBF	*2020 prices per MBF*
Westside conifer harvest cuts	$23. 20	$97. 50
Westside conifer thinnings	17. 90	92. 50
Ponderosa pine	17. 00	91. 60
Lodgepole pine	4. 40	53. 50

Economic Analysis

The estimates of yields, values, and costs developed for selected areas where management intensification appeared most promising were used in developing estimates of areas that would yield at least a 5-percent rate of return on marginal costs of intensification at both 1970 prices and the specified price increases. These calculations were on a "before taxes" basis. They were also made with consideration given to the timing of costs and yields for specific stands. Consequently, factors such as the need to sustain a given flow of timber harvest from an entire forest were not included.

Intensification Potentials With 1970 Prices

Under this price assumption the following practices promised to return more than 5 percent on increased expenditures for timber management in westside conifer areas. The acreages are for opportunities in addition to those assumed in the current trends of management:

a. Planting on high sites. This involved a total of 481,000 acres for the first decade.
b. Precommercial thinning followed by commercial thinning on medium and high sites, with short rotations of less than 50 years. This involved a total of 6,000 acres.
c. Commercial thinning in virtually all situations. This involved an estimated 166,000 acres.
d. Fertilization in stands to be thinned and given final harvest within 20 years. This involved an estimated 115,000 acres. (All but 23,000 of these acres are included in the 166,000 acres reported above in item c.)
e. Investments to develop and use genetically superior stock. This appeared justified only on high site lands managed under short rotations.

In eastside ponderosa pine stands commercial thinning of stands approximately 55 years old and having sufficient volume to support commercial operations also was found to be feasible.[11] However, judgment of local foresters indicated that only about 5 percent of the stands in the eastside ponderosa pine region reach this condition naturally. This would represent about 183 thousand acres in the ponderosa pine region of Oregon, Washington, and interior California.

Increases in timber cut from intensified practices that passed the 5 percent "investment screen" with 1970 prices are shown in table 98. On the three classes of ownerships studied in this analysis for the Pacific Coast States, increases in harvests resulting from increased investments, assuming 1970 prices, averaged only about 1 percent for the first three decades, and 3 percent for the fourth and fifth decades. In decade six—beyond the projection period of this study—a jump in the harvest would occur as stands that were planted in decade one became available for harvest. However, the increased cut would drop off again unless a succession of management programs were continued.

This modest showing is a result of a combination of factors. With 1970 prices there were not many practices with substantial growth increases that passed the 5 percent screen. For those practices that did pass there were relatively few acres in appropriate age—stocking classes that were susceptible to treatment. And finally, the investments involved in 1970 levels of management, which had to be subtracted from a total program of intensification, already account for a significant portion of the feasible economic opportunities.

Management Potentials with Rising Prices

With the higher prices for timber products specified earlier, additional practices that would pass a 5 percent investment screen in westside conifer stands included: (a) planting of all sites, with general use of genetic stock, except on low sites with long rotations (85 years)—a total of 1,287,000 acres, and (b) conversion to softwoods of mature hardwood stands of more than 45 years of age on medium sites, and conversion of all hardwood stands on high sites—1,384,000 acres.

In eastside types (a) precommercial thinning of ponderosa pine on all sites, and (b) precommercial thinning of lodgepole pine on the higher sites also passed the 5 percent investment screen.

Even with the assumption of increasing prices, the potential rise in total timber harvests from the ownerships studied with intensification of the most promising management opportunities would still be modest, i.e., 3 to 4 percent during the first three decades. However, projected harvest increases in decades four and five reach 15 percent, and in decade six 40 percent more than anticipated with 1970 management levels. With a single 10-year program, increases in harvests after decade six would drop to a level roughly comparable to that achieved in the first three decades. The major part of the increase—70 percent—would come from forest industry lands and 78 percent would be in the Douglas-fir region (table 98).

The investment costs of planting and other measures indicated in this example of intensified management are estimated at $168 million as shown in table 98, an average of $50 per acre.

It appears from this analysis that the only investment practices on these ownerships that would have a substantial impact on timber supplies in the Pacific Coast States within 50 years are planting of nonstocked areas and conversion of hardwoods to conifer stands on private lands where short rotations are assumed. These practices would be justified with a 5 percent cost of capital only with substantial price increases over 1970 levels.

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[11] See also: Sassaman, R. W., J. W. Barrett, and J. G. Smith. Economics of thinning stagnated ponderosa pine sapling stands in the pine-grass areas of central Washington. USDA Forest Serv. Res. Pap. PNW-144, 17p. 1972.

TABLE 98.—*Costs and responses to intensified forest management in Washington, Oregon, and California* [1]

Item	Area	Cost	Change in annual harvest								
			First	Second	Third	Fourth	Fifth	Sixth	Seventh	Eighth	Ninth
ASSUMING 1970 PRICE LEVELS	*Thousand acres*	*Million dollars*	*Million bd. ft.*[2]	*Million bd. ft.*[2]	*Million bd. ft.*[2]	*Million bd. ft.*[2]	*Million bd. ft.*[2]	*Million bd. ft.*[2]	*Million bd. ft.*[2]	*Million bd. ft.*[2]	*Million bd. ft.*[2]
Douglas-fir region:											
Other public	183	5.2	41.2	41.2	35.9	32.2	27.1	21.7	19.9	19.9	---------
Forest industry	351	12.3	---------	---------	---------	189.5	224.6	491.4	21.9	87.7	112.1
Other private	80	3.4	16.3	13.7	3.8	1.1	21.6	49.1	11.9	47.5	60.8
Total	614	20.8	57.5	54.9	39.7	222.8	273.3	562.2	53.7	155.1	172.9
California:											
Other public	5	.1	.5	.3	.2	---------	---------	---------	---------	---------	---------
Forest industry	80	2.0	7.3	11.4	5.8	36.5	23.4	80.6	2.1	8.3	10.6
Other private	53	(3)	16.3	25.7	13.1	12.3	29.7	1.3	.9	3.6	4.5
Total	138	2.2	24.1	37.4	19.1	48.8	53.1	81.9	3.0	11.9	15.1
Ponderosa pine region:											
Other public	25	---------	4.2	4.2	4.2	4.2	---------	---------	---------	---------	---------
Forest industry	33	---------	9.6	15.1	7.7	6.9	−17.5	---------	---------	---------	---------
Other private	49	---------	14.0	22.2	11.3	10.0	−26.1	---------	---------	---------	---------
Total	107	---------	27.8	41.5	23.2	21.1	−43.6	---------	---------	---------	---------
Pacific Coast States:											
Other public	212	5.3	45.9	45.7	40.3	36.4	27.1	21.7	19.9	19.9	---------
Forest industry	464	14.3	16.9	26.5	13.5	232.9	230.5	572.0	24.0	96.0	122.7
Other private	182	3.4	46.6	61.6	28.2	23.4	25.2	50.4	12.8	51.1	65.3
Total	859	23.0	109.4	133.8	82.0	292.7	282.8	644.1	56.7	167.0	188.0
ASSUMING RISING PRICE LEVELS [4]											
Douglas-fir region:											
Other public	535	38.9	349.9	349.9	344.6	338.4	320.0	300.2	298.4	295.9	---------
Forest industry	1,098	51.9	---------	---------	---------	493.6	704.2	1,900.8	34.0	139.7	177.6
Other private	717	48.5	38.1	−4.8	7.7	328.3	437.6	1,542.8	22.4	92.9	117.6
Total	2,350	139.3	388.0	345.1	352.3	1,160.3	1,461.8	3,743.8	354.8	568.5	295.2
California:											
Other public	32	1.3	18.0	18.0	17.9	17.7	17.4	17.4	17.4	17.4	17.4
Forest industry	406	14.3	7.3	11.4	5.8	163.1	210.5	538.9	5.9	13.0	32.3
Other private	289	13.0	16.3	25.7	13.1	106.9	126.6	474.6	7.2	8.1	41.6
Total	727	28.6	41.6	55.1	36.8	287.7	354.5	1,030.9	30.5	38.5	91.3
Ponderosa pine region:											
Other public	43	---------	9.0	9.0	9.0	9.0	4.7	4.7	4.7	4.7	---------
Forest industry	111	---------	9.6	15.1	7.7	17.6	−2.6	15.4	14.6	2.8	87.9
Other private	144	---------	14.0	22.3	11.3	26.0	−5.4	23.7	25.2	3.3	105.2
Total	298	---------	32.6	46.4	28.0	52.6	−3.3	43.8	44.5	10.8	193.1
Pacific Coast States:											
Other public	610	40.2	376.9	376.9	371.5	365.1	342.1	322.3	320.5	318.0	17.4
Forest industry	1,615	66.2	16.9	26.5	13.5	674.3	912.1	2,455.1	54.5	155.5	297.8
Other private	1,150	61.6	68.4	43.2	32.1	461.2	558.8	2,041.1	54.8	104.3	264.4
Total	3,375	168.0	462.2	446.6	417.1	1,500.6	1,813.0	4,818.5	429.8	577.8	579.6

[1] Includes intensified management opportunities returning 5 percent or more on forest industry, farm and miscellaneous, and public lands other than National Forests.

[2] International ¼-inch rule.

[3] Less than 0.1 million.

[4] Assumes stumpage prices rising 1.5 percent annually.

POTENTIAL INCREASES IN TIMBER SUPPLY FROM IMPROVED UTILIZATION

In addition to increased timber output from cultural measures as illustrated above, there appear to be substantial opportunities for extending timber supplies by improvements in timber utilization.

Assumed Improvements in Utilization in Base Projections

As indicated in Chapters I and II, substantial progress has been made in improving utilization of timber on logging operations and in the processing of timber products. Nevertheless, in 1970—a rather poor year for the timber industries—nearly 1 billion cubic feet of plant residues was burned or discarded. On logging operations an additional 1.6 billion cubic feet of logging residues from growing stock, plus sizable volumes of limbs and other material from cull and dead trees, was left in the woods unutilized. Residual rough and rotten trees passed by in logging also represented a major potential source of fiber. Unsalvaged mortality of widely scattered trees lost to fire and other destructive agents totaled an estimated additional 4.2 billion cubic feet.

With higher prices and strong markets in 1971–72, volumes of residues are estimated to have declined somewhat. Also, it has been estimated in Chapter V that prospective expansion of the pulp and particleboard industries will lead in a relatively few years to essentially complete utilization of coarse plant residues and much of the fine plant residues produced. It was also estimated in Chapter II that with rising timber prices much of the roundwood now left on logging operations would also be utilized in future years primarily for woodpulp. Salvage of dead timber for both solid wood and fiber products is also expected to increase with higher prices and expansion of forest road systems.

Similar technical progress also was assumed in converting projected product demands to roundwood requirements in Chapter V. In the production of lumber, for example, it was estimated that with 1970 levels of research and development, prospective improvements in technology in the lumber industry would lead to increases in product output from a given volume of roundwood of 2 to 4 percent per decade. This would be in addition to the assumed 5 percent increase in recovery resulting from adoption in 1970 of new standards for softwood lumber. Increases in product recovery from such developments could be expected to increase stumpage values and the attractiveness of forestry investments, as well as extend timber supplies.

In addition to these developments in processing timber products, other technological changes were considered in Chapter V in estimating demands for lumber and other end products, such as increased efficiency in the use of timber products in construction, and use of plastics in lieu of lumber in the manufacture of furniture.

Additional Opportunities for Improved Utilization

There are nevertheless many additional opportunities for extending timber supplies beyond those assumed—particularly with increased relative prices of timber products. In the forest these include further increases in use of logging residues, use of wood fiber from nongrowing stock sources, and more complete salvage of mortality than is in prospect with 1970 management levels. In the mills these include greater use of modern equipment to increase output of lumber and other timber products from available log supplies. Further improvements are also possible in the use of wood products in construction and other end uses.

These possibilities for extending timber supplies might be captured by a combination of accelerated research and development efforts to gain new knowledge, increased efforts to inform possible users and to test new discoveries, subsequent industrial investments in plant and equipment, and in some cases changes in marketing practices in the forest industries.

The timing and extent of such further increases in timber utilization will of course depend on such factors as the rate of expansion of research and development, prospective rates of return from application of new technology, and the ability and willingness of forest industries to invest the required capital. In contrast to measures to increase timber growth which take considerable time to fully pay off, improved utilization of timber on areas currently harvested and in processing plants could have immediate as well as long-run results in extending timber supplies.

These potentials for further improvement of timber utilization may be illustrated by the following examples:

1. Timber sale practices, particularly on public lands, could be further modified to obtain more complete use of wood materials now wasted.
2. Research and development of methods of log extraction that will permit less road construction and minimize adverse environmental impacts could make timber management feasible on areas where timber harvesting is now uneconomic or unacceptable. Major advances are considered possible in use of aerial systems of logging, including use of cables, balloons, and helicopters, and in development of roads suitable for thinning operations.
3. Accelerated development and adoption of new processing technology in lumber and plywood manufacture could have the effect of extending available timber supplies. Much additional progress appears possible in adoption of thin kerf saws to increase lumber yields, for example, and in reducing or eliminating errors of judgment in cutting logs for maximum yield and optimum grade recovery. Lumber might also be sawed with greater precision and smoother surfaces and used "rough sawn" as is the custom in some foreign countries. Improved equipment for more accurate grading of structural lumber also could make possible greater efficiency in use of wood in construction.
4. Substitution of hardwoods for softwoods in construction, pulp, and possibly other uses would also help extend available softwood timber supplies.
5. Development of particleboards from residues or underutilized roundwood could serve in lieu of softwood plywood in various uses. Particleboard is now being produced in limited quantities for construction uses and current research indicates that various types of board could be made from a wide variety of materials of both softwood and hardwood species.[12]
6. In the pulp and paper industry continued development of higher yielding pulping processes

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[12] Heebink, B. G., and Ray Dominick. Forest residues: A future source of particleboard? Wood & Wood Prod. 76(11):26–28. 1971.

could lead to reduced wood use and a broadening of the resource base for pulping. Greater use of waste paper and board beyond that assumed in Chapter V may be possible through improved technology and/or changes in economic conditions or programs to increase consumer acceptance of paper with significant proportions of recycled fibers. Development and adoption of efficient methods of whole-tree harvesting and bark-chip separation also could greatly expand the raw material base for pulpwood, and thus improve the supply situation for other timber products.

7. Improved construction designs for housing and other structures, and the development and adoption of improved construction methods, could aid in conserving wood materials and reducing costs of end products. These might include stress skin panel construction systems, for example, or other improvements in design of structures or components. Many wooden structures are overdesigned and use more wood than necessary because of tradition, building codes, inadequate grading, or lack of knowledge. It is estimated that use of more efficient construction methods in residential building, for example, could reduce wood use as much as 10 to 20 percent with no significant sacrifice of performance. Also, increased use of wood preservative treatments in some construction uses would extend wood supplies.

8. Expansion of technical assistance to provide advice on adoption of new technology is also an important phase of accelerated efforts to improve timber utilization. Many examples can be found of poor log bucking practices, for example, or inefficiencies in lumber sawing and drying. Implementation of new technical discoveries is often a slow process, in part because of the slow spread of knowledge of new technology throughout producing industries.

It is of course difficult to quantify the costs, timing, and benefits of accelerated efforts to develop and apply new technology. Some programs, such as adoption of improved technology in lumber manufacture, could result in prompt increases in supply of wood products. Some other efforts are likely to require more time for acceptance and investment of capital in new plants. In any case it is apparent that there are many opportunities for extending available timber supplies by improved utilization over and above prospective trends.

PROJECTION ALTERNATIVES

The examples of timber management and utilization alternatives presented in this chapter should be regarded as preliminary. The major objective of these initial studies was to develop procedures that might be used in evaluating alternatives on given forest properties or in local regions, and provide some general indication of the costs and benefits of intensifying forestry practices. Much additional work will be required to improve estimates of yield responses to forest management and the costs and values of increasing outputs of timber and related goods and services.

In addition to the illustrations cited, many opportunities for intensification of management undoubtedly exist on lands of the forest industries and on public ownerships other than National Forests. New technology such as fertilization also represents potentials that were not specifically included at this time.

Use of criteria other than the specific economic conditions assumed in this analysis also could warrant much larger forestry efforts than indicated. Higher relative prices of timber products than assumed herein could have the effect of substantially increasing areas economically suitable for intensification.

The acceptance of lower rates of return would have similar effects. The rates of return used in the above analysis are measured in constant dollars. If inflation continues, the rates of return measured in current dollars would be substantially higher. For example, if inflation continues at the rate prevailing in the past couple of decades a 5-percent return in constant dollars would represent an 8- or 9-percent return in current dollars.

CHAPTER IV
AVAILABILITY OF WORLD TIMBER RESOURCES

This chapter presents information on recent trends in U.S. imports and exports of timber products together with an appraisal of the timber demand and supply situation in the major importing and exporting countries or regions of the world.

This appraisal, along with the anaylsis of the domestic timber situation contained in other chapters of this report, provides the basis for the projections of timber product imports and exports summarized at the end of this chapter and shown in detail in Chapter V. In view of the projected growth in demand for timber products in the United States, and the economic and environmental constraints on increasing domestic timber supplies, potentials for future timber imports and exports are matters of major significance in evaluating the U.S. timber situation.

TRENDS IN U.S. IMPORTS OF TIMBER PRODUCTS

As consumption of industrial timber products has risen to higher levels in the United States, this country has purchased increasing amounts of lumber, newsprint, woodpulp, plywood, and other products from other parts of the world. In 1972, U.S. imports of timber products reached an all-time high of 2.9 billion cubic feet, roundwood equivalent.[1] This was nearly two times the level of 1950 (fig. 47 and Append. IV, table 1). Timber imports in 1972 represented one-fifth of the total supply of timber products available to the United States.

The value of imports of timber products has also climbed rapidly, reaching $3.6 billion in 1972, or nearly double the value of exports (table 99). This represented about 6.5 percent of the value of all U.S. imports of merchandise.

Lumber.—Prior to 1941 the United States was a net lumber exporter but since then lumber imports have climbed steadily and rapidly. Between 1950 and 1972 lumber imports rose from 0.5 billion cubic feet (3.4 billion board feet) to 1.5 billion cubic feet (9.4 billion board feet) (fig. 47 and Append. IV, table 2)—a rise that accounted for over half of the total growth in imports during this period.

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[1] "Roundwood equivalent" represents the volume of logs or other round products required to produce woodpulp, paper, plywood, or other processed materials. It is recognized that portions of imports and exports of products such as woodpulp are produced from plant residues and thus do not actually represent roundwood production in addition to the logs used primarily for lumber or plywood. Figures for roundwood equivalent are used to indicate relative volumes of processed products.

Imports and exports of forest products

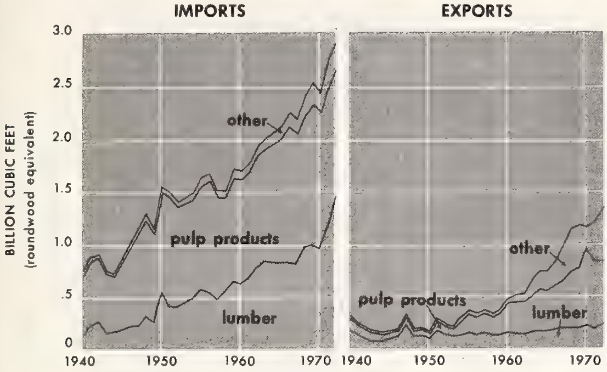

Figure 47

Nearly all of the growth in lumber imports has been composed of softwoods from Canada, chiefly from British Columbia. Hardwood lumber imports, mostly from the tropical regions of the world and Canada, have fluctuated between 0.2 and 0.4 billion board feet per year during the past couple of decades.

Pulp products.—Imports of woodpulp, newsprint, and other grades of paper and board have also increased since 1950. In earlier years much of the imported pulp and paper came from Scandinavia but recently by far the largest part of these imports have originated in Canada (Append. V, tables 29 and 33).

About 7 percent of the imports of pulp products in 1972 was composed of round pulpwood and chips (Append. IV, table 3). In the past two decades, volumes of pulpwood imports have fluctuated between 1.0 and 2.5 million cords. Most pulpwood imports have come from Canada, although some imports have originated in the Bahamas in recent years.

Plywood and veneer.—Although not large in terms of cubic volume, hardwood plywood and veneer imports have shown very rapid growth since 1950, rising from 5 million to over 200 million cubic feet, roundwood equivalent (Append. IV, tables 1, 4, and 5). Over nine-tenths of these imports have come from Korea, Taiwan, Japan, and the Philippines. Most of the timber used in the manufacture of these products, however, has originated in tropical hardwood forests in the Philippines, Malaysia, and Indonesia.

Other.—Small volumes of logs, softwood plywood, particleboard, and miscellaneous roundwood products such as posts and poles also have been imported. Most of these imports have been cross-border trade with Canada.

The rise in imports of timber products over the past three decades is attributed to:

- rising consumption of industrial timber products in the United States,
- a tightening domestic timber supply situation and economic development of timber resources in Canada and the Western Pacific Area,
- effective marketing efforts by timber producers in exporting countries.

TRENDS IN U.S. EXPORTS OF TIMBER PRODUCTS

Exports of timber products in recent years have followed about the same upward trend as imports, rising from 0.1 billion cubic feet in 1950 to 1.3 billion in 1972 (fig. 47, and Append. IV, table 6).

Value of timber exports also climbed sharply to $2.0 billion in 1972, or about 4.2 percent of the total volume of all U.S. merchandise exports in that year (table 99).

Lumber.—Exports of lumber, chiefly softwoods, have roughly tripled since the early 1950's, rising from 0.1 billion cubic feet roundwood equivalent (0.5 billion board feet) to 0.2 billion cubic feet in 1972 (1.5 billion board feet) (Append. IV, table 7). Most of the increased shipments in recent years have gone to Japan, with smaller amounts to Europe, Latin America, and other countries.

Pulp products.—Exports of pulp products also increased rapidly in the 1950–72 period moving up from less than 0.1 to 0.6 billion cubic feet, roundwood equivalent. Western Europe has taken substantial amounts of pulp and liner board, for example, while large quantities of woodpulp have been shipped to the Far East, largely to Japan (Append. V, tables 28 and 32).

Pulp chips produced from slabs and other residues of primary timber processing have made up a growing part of the shipments of pulp products to Japan since the mid-1960's (Append. IV, table 8). In 1972, some 2.5 million tons of chips (142 million cubic feet roundwood equivalent) were exported to Japan from the Pacific Coast. Small volumes of round pulpwood were exported to Canada.

Logs.—Exports of logs have also increased rapidly since the late 1950's to about 0.5 billion cubic feet in 1972 (3.1 billion board feet local log scale or roughly 4.1 billion board feet lumber tally). By far the largest part of these exports consisted of softwood logs (3.0 billion board feet), with nearly 90 percent of these going to Japan (Append. IV, tables 9 and 10). Log exports to Canada also have increased to a little over a half billion board feet in 1972.

Other.—Exports of items such as plywood and veneer, poles, piling, etc., have grown, but the volumes involved have represented a very small part of the harvest of roundwood from U.S. forests.

TABLE 99.—*Imports and exports of timber products, volume and value, 1972*

Item	Unit of measure	Imports [1]		Exports [1]	
		Volume	Value	Volume	Value
			Million dollars		*Million dollars*
Logs:					
Softwoods	Million board feet	11. 3	0. 7	3, 049. 4	392. 5
Hardwoods	do	28. 0	3. 4	93. 9	42. 1
Total	do	39. 3	4. 1	3, 143. 3	434. 5
Lumber:					
Softwoods	do	8, 976. 9	1, 010. 0	1, 173. 2	201. 9
Hardwoods	do	445. 2	88. 8	249. 7	72. 6
Railroad ties	do	7. 9	. 8	29. 2	5. 0
Total	do	9, 430. 1	1, 099. 5	1, 452. 1	279. 5
Veneer:					
Softwoods	Million square feet	365. 4	5. 8	287. 4	9. 2
Hardwoods	do	2, 786. 0	63. 7	204. 3	12. 7
Total	do	3, 151. 4	69. 4	491. 8	21. 9
Plywood:					
Softwoods	do	5. 9	. 5	220. 4	31. 5
Hardwoods	do	6, 427. 3	336. 9	30. 7	5. 3
Total	do	6, 433. 2	337. 3	251. 1	36. 9
Pulpwood:					
Round	Thousand cords	307	10. 0	142	3. 3
Chips	do	699	10. 4	1, 825	57. 1
Total	do	1, 005	20. 4	1, 966	60. 4
Woodpulp	Thousand tons	3, 728	494. 2	2, 253	357. 7
Paper and board:					
Newsprint	do	7, 101	1, 056. 1	145	20. 4
Other paper and board	do	893	125. 6	2, 856	570. 6
Paper and board products	do	39	32. 8	167	135. 4
Total	do	8, 033	1, 214. 6	3, 168	726. 4
Other wood products [2]	do		367. 2		120. 4
Total, all timber products			3, 606. 8		2, 037. 8

[1] Data may not add to totals because of rounding.

[2] Includes poles and piling, fuelwood, particleboard, wood charcoal, cork, wastepaper, wood containers, wood doors, and other miscellaneous products. Does not include wood furniture nor printed materials.

Sources: U.S. Department of Commerce, Bureau of the Census. *U.S. imports, commodity by country, December 1972.* FT 135; and *U.S. exports, commodity by country, December 1972.* FT 410. Supt. of Documents, U.S. Government Printing Office, Washington, D.C.

The recent rise in exports of timber products from the United States is attributed to:

- rapid growth in world timber demands, particularly in Japan and Western Europe,
- availability of high-quality kraft pulp and liner board from the southern United States, and high-grade lumber, softwood logs, and chips from the Pacific Northwest,
- a special situation in Alaska favoring pulp and lumber exports to Japan.

TRENDS IN U.S. NET IMPORTS OF TIMBER PRODUCTS

During the first five decades of this century the United States gradually changed from a net exporting country to a net importer (fig. 48). By 1950, the United States was dependent on foreign sources for about a tenth of all timber products consumed.

Between 1950 and 1970, net imports remained

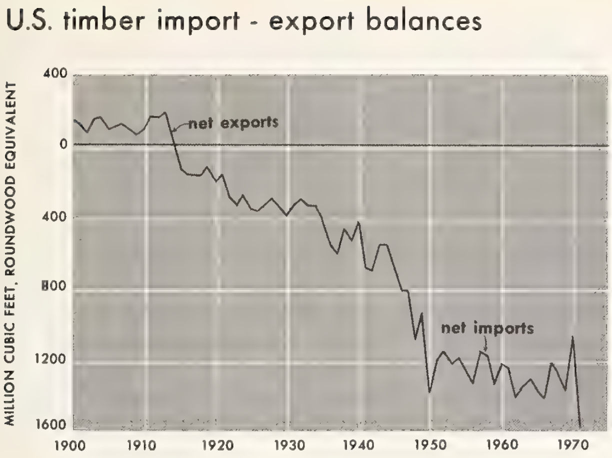

Figure 48

at about 1.3 billion cubic feet a year, but in 1972 net imports reached a new peak of 1.6 billion cubic feet (Append. IV, table 11). This represented about 11 percent of the timber products consumed in the United States.

The balance of trade in timber products measured in dollars has been very similar to balances of physical volumes (table 99). In most recent years values of imports exceeded values of exports by about $1 billion a year.

Lumber.—Net imports of lumber amounted to 8 billion board feet in 1972, or 1.2 billion cubic feet roundwood equivalent. This represented 17 percent of the lumber consumed in the United States—a figure materially above 1950 when net imports accounted for only 7 percent of U.S. lumber use.

Pulp products.—Net imports of pulp products in 1972 totaled about 0.6 billion cubic feet, roundwood equivalent—about a third below the early 1950's. Net imports as a proportion of U.S. consumption of pulp products also showed a sharp decline from 37 percent of total consumption in 1950 to 15 percent in 1972.

Plywood and veneer.—Net imports of plywood and veneer in 1972 amounted to 0.2 billion cubic feet, roundwood equivalent—or 16 percent of total U.S. plywood and veneer consumption. Imports accounted for about 62 percent of the hardwood plywood and veneer consumed, but only a negligible part of softwood plywood consumption.

Logs.—In the early 1950's there was a small net import of logs, but this changed rapidly in the 1960's to a net export volume of about 0.5 billion cubic feet in 1972—a volume equal to 4 percent of U.S. roundwood production.

Future trends in imports and exports of timber products will largely depend on the economic availability of timber in the major forested regions of the world, and on the timber demand-supply-price situation in the major consuming areas. The timber situation in Canada, the predominant source of U.S. imports, and to a lesser extent in the tropical hardwood areas, is of primary importance for timber supplies. Export markets in western Europe and Japan are of particular significance to U.S. exporters.

WORLD TIMBER DEMANDS

Consumption of industrial timber products has been growing rapidly in all parts of the world, with a rise of some 70 percent between 1950 and 1969. Projections prepared by the Food and Agriculture Organization of the United Nations and other organizations point to substantial increases in demands in the decades ahead.[2]

The United States, Europe, and Japan consume over half of all the industrial wood produced in the world, and are dependent on other regions for a significant part of this supply (table 100). The studies referred to above indicate that this dependency on imports is likely to increase.

The Situation in Europe

In 1970 an estimated 11.9 billion cubic feet of industrial wood—about a quarter of world production—was consumed in Europe, excluding the Soviet Union. About two-thirds of this volume was used in the European Economic Community (the Common Market), the British Isles, and northern Europe. Another fifth was consumed in eastern Europe, with the remaining volume about equally divided between central and southern Europe.

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[2] Examples of relevant studies include:

Algvere, Karl Viktor. Forest economy in the USSR. Studia Forestalia Suecica, No. 39, Royal College of Forestry, Stockholm, Sweden. 1966.

Food and Agriculture Organization of the United Nations. Wood: World trends and prospects. FFHC Basic Study 16, 131 p. Rome. 1967.

——— Outlook for pulp and paper consumption, production and trade to 1985. Second Consultation on World Pulp and Paper Demand, Supply and Trade. Rome. 1971.

——— and United Nations Economic Commission for Europe. European timber trends and prospects, 1950–1980, an interim review. 2 V. (182 p. and 139 p.) Geneva. 1969.

Japan Lumber Journal, Inc. Timber demand forecast for 1975. Japan Lumber J. 10(9):1, 4. May 31, 1969.

Solecki, J. S. Russia-China-Japan, economic growth, resources and forest industries. British Columbia Univ. 1967.

Takeuchi, Kenji. The market potential for tropical hardwood with emphasis on the Asia Pacific region. International Bank for Reconstruction and Development, Office Rpt. September 1971.

United Nations Centre for Housing, Building and Planning. Housing needs, trends and prospects. Unasylva Vol. 25(2–3–4), nos. 101–102–103, p. 7–25. 1971.

United Nations Economic and Social Council, Economic Commission for Europe Timber Committee. TIM/Working Paper No. 173/Add. 1, 19 p. July 12, 1972.

As indicated in the tabulation below, the 1970 level of timber consumption in Europe was nearly double the annual average of 1949–51.

Product	*1949–51*	*1959–61*	*1970*[1]
	(Billion cubic feet wood raw material equivalent)		
Sawnwood	3.5	4.6	5.6
Wood-based panels	0.2	0.6	1.4
Paper, paperboard, and dissolving pulp	1.2	2.4	4.1
Pitprops and miscellaneous roundwood	1.3	1.2	0.8
Total industrial roundwood	6.2	8.8	11.9

[1] Preliminary estimate.

Source: United Nations Economic and Social Council, Economic Commission for Europe Timber Committee. TIM/Working Paper No. 173/Add. 1, 19 p. July 12, 1972.

TABLE 100.—*World production and consumption of timber products, 1969*

[Billion cubic feet, roundwood equivalent]

ALL PRODUCTS

Country	Production	Net imports	Net exports	Apparent consumption
United States	11.5	1.4	--------	12.9
Europe	11.1	1.4	--------	12.5
Japan	1.8	1.4	--------	3.2
U.S.S.R	13.4	--------	1.0	12.4
Rest of world	37.8	--------	3.2	34.6
Total	75.6	4.2	4.2	75.6

INDUSTRIAL WOOD

Country	Production	Net imports	Net exports	Apparent consumption
United States	10.9	1.4	--------	12.3
Europe	8.8	1.4	--------	10.2
Japan	1.6	1.4	--------	3.0
U.S.S.R	10.2	--------	1.0	9.2
Rest of world	11.2	--------	3.2	8.0
Total	42.7	4.2	4.2	42.7

Source: Food and Agriculture Organization of the United Nations. *Yearbook of forest products, 1969–70.* Rome. 1971.

Most of the growth in consumption in the 1950–79 period was in pulp products, although there were also substantial increases in sawnwood and wood-based panel products. During the 1960's Europe changed from a net exporter of pulp and panel products to a net importer of these items, including substantial quantities of kraft pulp and liner board and some imports of softwood plywood from the United States.

The major part of the other industrial wood products consumed in Europe was derived from European forests. Much of the consumption derived from net imports consisted of softwood lumber from the USSR, Canada, and the United States, and hardwood lumber from other countries such as West Africa and the Asia-Pacific area.

In general the dependence of Europe on imports from the Soviet Union and North America showed a marked rise in the 1950's and 1960's. There was also a significant increase in imports from Africa. The trade balance with the Asia-Pacific region and Latin America was essentially unchanged.

Projections indicate that consumption of industrial timber products is likely to continue to rise with continued expansion of European economies. Estimated demands for industrial timber products increase by about 27 percent between 1970 and 1980 (table 101), and roughly double by 2000.[3] Most of the projected growth is for pulp and paper products and wood-based panels. Demands for sawnwood are expected to grow only a little faster than population, while demands for miscellaneous roundwood are expected to decline.

Studies of the prospective European timber supply situation indicate that timber supplies from European forests could be expanded. However, the increase in supplies is much below the anticipated growth in demands. As a result timber deficits are projected to 2.3 billion cubic feet by 1980, some 60 percent above 1970 (table 101). Longer run assessments indicate that by 2000 the deficit may be somewhere between 4.2 and 7.9 billion cubic feet.[3]

Recent developments in Europe suggest the deficit may be in the higher part of this range. For example, rapid increases in labor costs in Europe and the need to protect the environment may constrain intensified timber management, as suggested by the following quotation from a report of the Timber Committee of the Economic Commission for Europe:[4]

"The rapid increase in the importance attached to environmental problems in Europe may have far-reaching repercussions on the management of existing forest resources, to the extent that environmental requirements may impose certain limitations on forestry's traditional role of supplying wood. These repercussions may be of different types: they may lead to certain forest areas being declared protection, conservation or recreation areas, with severe restrictions on their commercial exploitation, or they may constitute hindrances to normal management and exploitation because of landscaping and similar constraints and thus affect the economics of production."

Although future European timber deficits are uncertain, it seems reasonably clear that import

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[3] United Nations Economic and Social Council, Economic Commission for Europe, Timber Committee. TIM/Working Paper No. 173/Add. 1, 19 p. July 12, 1972.

[4] Op. cit., p. 15, footnote 3.

TABLE 101.—*Consumption and domestic supplies of industrial wood in Europe in 1965 and 1970, with projections to 1980*

[Million cubic feet, roundwood equivalent]

Item	1965	1970	Projections	
			1975	1980
Consumption of sawn wood, plywood and veneers	5, 579	6, 073	6, 179	6, 426
European removals of saw logs, veneer logs, etc	4, 661	5, 049	5, 155	5, 438
Apparent shortfall	918	1, 024	1, 024	988
Consumption of other industrial forest products	4, 696	5, 897	7, 133	8, 757
European removals of pulpwood, pitprops, and miscellaneous roundwood, and transfer of residues	4, 449	5, 473	6, 285	7, 415
Apparent shortfall	247	424	848	1, 342
Consumption of all products	10, 275	11, 970	13, 312	15, 183
Total European removals and residues transfer	9, 110	10, 522	11, 440	12, 853
Total apparent shortfall	1, 165	1, 448	1, 872	2, 330

Sources: 1965, 1975 and 1980—Food and Agriculture Organization of the United Nations and United Nations Economic Commission for Europe. *European timber trends and prospects, 1950–1980, an interim review.* Vol. 1, 182 p. Geneva. May 1969.

1970—United Nations Economic and Social Council, Economic Commission for Europe, Timber Committee. TIM/Working Paper No. 173/Add. 1, 19 p. July 12, 1972.

demands will continue to increase. These expectations in part underlie the projections of U.S. exports of pulp and paper products shown in Chapter V. In the case of lumber and logs, it seems likely that nearly all of the growth in European demands for these products will be met by imports from the Soviet Union, Canada, and tropical hardwood regions.

The Situation in Japan

The phenomenal economic growth of Japan in the last couple of decades resulted in a sixfold increase in industrial wood consumption between 1950 and 1972 to 3.6 billion cubic feet, roundwood equivalent (table 102).

Although Japan is heavily forested, its timber resources are relatively limited in relation to population. Japanese forests were also severely depleted by heavy cutting during World War II. To meet the rapidly increasing domestic and export demands for timber products, imports of logs and other products into Japan have increased sharply to 56 percent of total supplies in 1972.

For many years imports were mainly tropical hardwood logs for use in production of plywood, but since the early 1960's imports of softwood logs for the manufacture of lumber, and imports of chips for pulp manufacture, also have risen sharply. Most of the softwood log imports have originated in the United States and the Soviet Union. By far the largest part of the chip imports have come from the United States. Canada and the United States have supplied most of the imported pulp and paper.

Estimates of the Japanese Forestry Agency indicate that demand for timber products will continue to grow rapidly to an estimated 4.8 billion cubic feet by 1981 (table 103). Imports are expected to play an increasingly important role, rising to about 3 billion cubic feet by 1981, or 63 percent of total projected demands. In time Japanese forests are expected to be capable of supplying an increasing share of total demands. By the year 2021, for example, domestic wood production is projected to reach 3.3 billion cubic feet—double the 1972 level of domestic timber harvests.

This outlook could, of course, be changed by shortfalls in forestry programs, diversions of forest land to other uses, or constraints on timber production associated with protection of the environment. In any event, it seems clear that Japan is likely to continue to be a major importer of timber products from North America, Siberia, Southeast Asia, and perhaps other areas during the next few decades.[5]

The projections of U.S. exports, summarized at the end of this chapter, assume that without U.S. export controls shipments to Japan of logs, chips, woodpulp, and lumber will continue to rise somewhat. However, it was also assumed that increases in exports will be limited by increasing competition and rising prices for logs on the Pacific Coast, anticipated expansion in use of wood by the U.S. pulp and paper industry, and possible increases in timber supplies from Siberia and tropical sources.

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[5] Crawford, G. S. The Japanese lumber market, some trends in factors of significance for British Columbia. British Columbia Res. Counc., Vancouver, B.C. 1965.

TABLE 102.—*Timber products consumed in Japan, 1970–72, by source of supply*

[Million cubic feet, roundwood equivalent]

Item and source	1970	1971	1972
Domestic supply	1,632.7	1,589.0	1,585.4
Foreign supply:			
Logs:			
United States	336.5	251.1	366.2
U.S.S.R	247.2	247.2	280.0
Canada	19.1	23.0	9.5
South Seas Lauan	614.4	649.7	635.9
New Zealand	59.3	62.5	63.6
Other	113.3	116.5	121.5
Total logs	1,389.8	1,350.0	1,476.7
Lumber:			
United States	44.4	39.6	52.2
U.S.S.R	6.0	6.0	6.0
Canada	102.6	54.6	55.8
South Sea Lauan	14.4	12.6	8.4
New Zealand	4.8	5.4	6.0
Other	9.0	6.6	15.0
Total lumber	181.2	124.8	144.0
Wood chips:			
United States	205.0	116.7	161.1
New Zealand	10.5	5.6	6.8
Other	27.2	47.5	61.1
Total wood chips	242.6	169.8	229.0
Woodpulp:			
United States	60.6	46.1	58.0
U.S.S.R	3.8	2.1	2.4
Canada	85.2	61.2	66.0
New Zealand	0.4	0.3	0.8
Other	8.9	5.9	10.1
Total woodpulp	158.9	115.7	137.3
Paper and board:			
United States	NA	0.8	1.4
Canada	NA	5.0	8.1
Other	NA	1.3	5.1
Total paper and board	10.1	7.1	14.6
Total foreign supply	1,982.6	1,767.4	2,001.6
Total supply	3,615.3	3,357.4	3,587.0

Sources: Derived from data published by Japan Forestry Agency. *Timber demand and supply for 1971–1972.* Japan Lumber Journal, 13(1), January 10, 1972; and Ministry of Finance, Japan Tariff Association, *Japan exports and imports, commodity by country.* Tokyo, December 1971 and November 1972.

TABLE 103.—*Consumption, domestic production, and imports of industrial timber products in Japan, 1969–71, with projections to 2021*[1]

[Million cubic feet, roundwood equivalent]

Item	1969–71 annual average	Projections		
		1981	1991	2021
Consumption of industrial timber for:				
Lumber	2,133	2,528		
Pulp products	830	1,416		
Plywood and miscellaneous products	561	816		
All products	3,527	4,760	5,201	5,399
Domestic production	1,635	1,755	2,073	3,330
Imports	1,893	3,005	3,128	2,069

[1] Data may not add to totals because of rounding.

Source: Japan Ministry of Agriculture and Forestry. *Basic plan relating to forest resources and long-term forecasts relating to the demand for and supply of important forest products.* Cabinet Decision. February 16, 1973.

The Situation in Other Countries and Regions

Although most of the U.S. export trade in timber products has been with Europe and Japan, there have been significant exports of woodpulp, paper and board, lumber, logs, veneer, and plywood to Canada and other countries of the world and these exports have been rising slowly (Append. IV). In the projections shown in Chapter V some allowances have been made for increased shipments to U.S. export markets around the world.

WORLD FOREST LAND AND TIMBER RESOURCES

A large part of the forest resources of the world has never been surveyed, and the available data on forest areas and timber volumes for many forested areas undoubtedly contain substantial errors of estimate. Nonetheless, it seems apparent that there are a number of potentials for expanding production and exports of timber products in various forested regions.

Forest Areas

Forests cover an estimated 9,172 million acres, or about 28 percent of the world's land area (table 104). About two-thirds of these forest lands support hardwood species; only one-third is classed as softwood forests. The world's softwood acreage is concentrated in the USSR (1,366 million acres) and in North America (1,087 million acres), with only 525 million acres in all other countries.

TABLE 104.—*Land and forest areas in the world*

[Million acres]

Area	Total land area	Forest land			Forest land available for wood production
		Total	Softwood	Hardwood	
North America	4, 633	1, 754	1, 087	642	1, 013
Latin America	5, 019	1, 962	86	1, 831	862
Europe	1, 129	366	213	153	312
Africa	7, 339	1, 757	10	1, 700	729
Asia (except Japan and U.S.S.R.)	6, 580	1, 233	183	1, 016	815
Japan	247	59	25	32	57
U.S.S.R	5, 297	1, 824	1, 366	432	1, 730
Pacific area	2, 081	227	7	210	118
World	32, 205	9, 172	2, 978	6, 017	5, 636

Source: Food and Agriculture Organization of the United Nations. *Supply of wood materials for housing.* World Consultation on the Use of Wood in Housing, Secretariat Pap., Sect. 2. 1971.

A large part of the total forest area is not available for timber harvest—that is, it is reserved for other uses or is not productive enough to produce commercial crops of timber. However, some 5.6 billion acres, or 61 percent of the world's forest area, may be sufficiently productive and available for commercial timber production.

Timber Volumes

The forests of the world contain an estimated 12.6 trillion cubic feet of timber (table 105). Softwoods make up only one-third of this timber inventory. North America and the USSR contain the largest volumes of softwood growing stock, while Latin America, Africa, and Southeast Asia have most of the hardwood volumes.

TABLE 105.—*Forest growing stock in the world, by area and species group*

[Billion cubic feet]

Area	Total	Softwoods	Hardwoods
North America	2, 083	1, 395	689
Latin America	4, 340	99	4, 241
Europe	473	290	184
Africa	1, 232	11	1, 222
Asia (except Japan and U.S.S.R.)	1, 444	212	1, 232
Japan	67	35	32
U.S.S.R	2, 807	2, 345	463
Pacific Area	177	11	166
World	12, 623	4, 396	8, 227

Source: Food and Agriculture Organization of the United Nations. *Supply of wood materials for housing.* World Consultation on the Use of Wood Housing, Secretariat Pap., Sect. 2. 1971.

Timber Production

Total timber inventory volumes are not necessarily indicators of an area's importance as a timber producer. Other factors such as species and quality of timber, physical and economic accessibility, and institutional or political limitations also affect timber harvests and manufacturing. Thus about three-fourths of all timber cut for industrial use in 1967–69 was produced from softwood forests in North America, the USSR, Europe, and other countries (table 106). In recent decades growth in softwood production has been most rapid in the USSR, which has the greatest volume of untapped softwood forest resources.

Production of industrial wood products from hardwoods amounted to nearly one-fourth of the world harvest of roundwood in 1967–69. About two-thirds of this industrial hardwood timber production came from North America, Asia, and Europe—even though these areas contain only 25 percent of the world's hardwood growing stock inventory. Latin America contains over half the total world hardwood resources, but has accounted for less than 10 percent of world production of hardwood products.

Timber Supply Potential

Prospects for significant additions to softwood timber production and exports from existing but unutilized resources seem limited to the northern parts of Canada and Siberia. Both Canada and the USSR have indicated a desire to develop their forest resources. Unused timber in both countries is under government control and hence government policies, as well as trends in prices and market and availability of investment capital, will be significant factors in determining how rapidly expansion of timber industries take place.

TABLE 106.—*Average annual harvest of industrial roundwood in the world, by area, 1950–52 and 1967–69*

[Million cubic feet]

Area	1950–1952			1967–1969		
	Total	Softwoods	Hardwoods	Total	Softwoods	Hardwoods
North America	11,017	8,933	2,083	14,548	11,864	2,684
Latin America	1,095	424	671	1,554	706	847
Europe	6,391	5,191	1,201	8,616	6,179	2,436
Africa	530	35	494	1,201	177	1,024
Asia (except Japan and U.S.S.R.)	1,942	742	1,201	3,778	1,130	2,648
Japan	953	847	106	1,730	1,095	636
U.S.S.R.	6,250	5,402	847	10,205	9,039	1,165
Pacific Area	388	106	282	636	318	318
World	28,566	21,680	6,885	42,266	30,508	11,758

Source: Food and Agriculture Organization of the United Nations. *Supply of wood materials for housing.* Consultation on the Use of Wood in Housing, Secretariat Pap., Sect. 2. 1971.

Hardwood forests in most of the hardwood regions of the world, including the United States, also could support higher levels of harvest in the next several decades. Most of this potential is in the hardwood forests of Southeast Asia, Africa, and Latin America. In many areas availability of capital and the rate of economic development will be important factors in determining future increases in hardwood timber supplies.

POTENTIAL TIMBER SUPPLIES FROM CANADA

The timber resources of Canada are of special significance to the United States, for both geographic and economic ties make Canada a primary timber supply region for this country. Canada is the leading timber exporting nation in the world, with three-fourths of her exports going to the United States.

Forest Resources

Canadian forests include some 588 million acres of forest land suitable and available for timber production (table 107), or 18 percent more area than the commercial timberlands of the United States. Timber volumes on Canada's inventoried nonreserved forest land totaled an estimated 503 billion cubic feet of softwoods in 1968 (table 108), some 71 billion cubic feet more than softwood inventories on commercial timberlands in the United States. Canadian forests also included an additional 127 billion cubic feet of hardwoods, about 90 billion cubic feet less than in the United States.

Production Trends

Output of both the lumber and pulp and paper industries in Canada has climbed steadily in recent

TABLE 107.—*Forest land areas in Canada, by Province, 1967*

[Thousand acres]

Province	Total	Suitable for regular harvest	Not suitable for regular harvest	Reserved
Atlantic [1]	56,685	47,723	8,311	651
Quebec	171,827	121,845	49,920	62
Ontario	120,534	115,471	105	4,958
Prairie [2]	132,712	119,608	4,979	8,125
British Columbia	138,076	134,838		3,238
Northwest Territories and Yukon	176,512	48,808	127,704	
Total	796,346	588,293	191,019	17,034

[1] Includes Newfoundland, Prince Edward Island, Nova Scotia, and New Brunswick.

[2] Includes Manitoba, Saskatchewan, and Alberta.

Source: Manning, Glenn H., and H. Rae Grinnell. *Forest resources and utilization in Canada to the year 2000.* Canadian Forestry Serv. Publ. 1304, 80 p. Ottawa, Ont. 1971.

TABLE 108.—*Merchantable timber in Canada on inventoried nonreserved forest land, by Province and by softwoods and hardwoods, 1968* [1]

[Million cubic feet]

Province	Total	Soft-woods	Hard-woods
British Columbia [2]	268, 635	261, 313	7, 322
Prairie Provinces	89, 331	55, 923	33, 408
Ontario	111, 423	66, 593	44, 830
Quebec	130, 397	96, 954	33, 443
Atlantic Provinces	29, 612	22, 100	7, 512
Total	629, 398	502, 883	126, 515

[1] Includes 445 million acres of inventoried forest land. Excludes Labrador, Yukon, and Northwest Territories.

[2] Mature timber volumes only.

Source: Manning, Glenn H., and H. Rae Grinnell. *Forest resources and utilization in Canada to the year 2000.* Dept. of the Environment, Canadian Forestry Serv. Publ. 1304, 80 p. Ottawa, Ont. 1971.

decades, particularly following World War II. Between 1950 and 1971 annual production of lumber and paper and board roughly doubled (table 109). Output of plywood and veneer and of woodpulp climbed even more rapidly.

These increases in output of industrial timber products have been achieved with a much smaller rise in timber cut. Partly this has been due to a decline in fuelwood production. Partly it reflects a substantial improvement in timber utilization practices. In 1968, for example, 26 percent of the raw material used in Canadian pulp mills was wood chips and other residues, compared with only 2 percent in 1950.[6]

Production Potentials

The 1970 timber cut of about 4.3 billion cubic feet in Canada was well below the calculated sustainable allowable cut of 10.7 billion cubic feet (table 110). Most of the unused Canadian timber is in the undeveloped northern parts of the Canadian provinces where utilization will necessarily involve high development costs. Thus it appears unlikely that a significant portion of the unused allowable cut would be placed on the market at 1970 prices. However, with June 1972 cost-price relationships for lumber and plywood, and somewhat higher prices for pulp and paper, the British Columbia Council of the Forest Industries has estimated that about 8 billion cubic feet of allowable cut would be economically available (table 110).

These and related projections of the Canadian Forestry Service indicated that by 2000 production of lumber, pulp, paper, and plywood could be substantially increased over 1970 levels (table 111). These Canadian studies also indicate that

TABLE 109.—*Timber harvest and production of timber products in Canada, by major product, 1950–71* [1]

Year	Total timber harvest	Lumber			Plywood (¼-inch basis)			Veneer (¹⁄₁₀-inch basis)			Paper and board			Wood-pulp
		Total	Soft-wood	Hard-wood	Total	Soft-wood	Hard-wood	Total	Soft-wood	Hard-wood	Total	News-print	Other	
	Billion cu. ft.	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Million tons*	*Million tons*	*Million tons*	*Million tons*
1950	3. 0	6. 6	6. 1	0. 5	0. 5	0. 4	0. 1	0. 4	0. 2	0. 2	6. 8	5. 3	1. 5	8. 5
1951	3. 4	6. 9	6. 4	. 5	. 6	. 5	. 1	. 5	. 3	. 2	7. 2	5. 5	1. 7	9. 3
1952	3. 2	6. 8	6. 3	. 5	. 6	. 5	. 1	. 4	. 2	. 2	7. 2	5. 7	1. 5	9. 0
1953	3. 1	7. 3	6. 8	. 5	. 8	. 6	. 2	. 6	. 3	. 3	7. 4	5. 8	1. 6	9. 1
1954	3. 1	7. 2	6. 8	. 4	. 9	. 7	. 2	. 5	. 2	. 3	7. 7	6. 0	1. 7	9. 7
1955	3. 3	7. 9	7. 5	. 4	1. 2	1. 0	. 2	. 6	. 3	. 3	8. 0	6. 2	1. 8	10. 2
1956	3. 5	7. 7	7. 3	. 4	1. 3	1. 1	. 2	1. 3	1. 1	. 2	8. 5	6. 5	2. 0	10. 7
1957	3. 2	7. 1	6. 7	. 4	1. 2	1. 1	. 1	. 7	. 5	. 2	8. 3	6. 4	1. 9	10. 4
1958	2. 9	7. 2	6. 8	. 4	1. 5	1. 3	. 2	. 8	. 6	. 2	8. 1	6. 0	2. 1	10. 1
1959	3. 2	7. 6	7. 2	. 4	1. 5	1. 2	. 3	. 8	. 6	. 2	8. 5	6. 3	2. 2	10. 8
1960	3. 3	8. 0	7. 6	. 4	1. 6	1. 4	. 2	. 7	. 5	. 2	8. 9	6. 7	2. 2	11. 5
1961	3. 2	8. 2	7. 8	. 4	1. 9	1. 6	. 3	. 7	. 5	. 2	9. 1	6. 7	2. 4	11. 8
1962	3. 3	8. 8	8. 4	. 4	2. 0	1. 7	. 3	. 9	. 6	. 3	9. 2	6. 7	2. 5	12. 1
1963	3. 5	9. 8	9. 4	. 4	2. 5	2. 1	. 4	1. 1	. 8	. 3	9. 3	6. 6	2. 7	12. 5
1964	3. 6	10. 3	9. 8	. 5	2. 6	2. 2	. 4	. 9	. 6	. 3	10. 2	7. 4	2. 8	13. 7
1965	3. 7	10. 8	10. 3	. 5	2. 7	2. 3	. 4	1. 4	1. 0	. 4	10. 9	7. 8	3. 1	14. 6
1966	3. 8	10. 6	10. 0	. 6	3. 0	2. 6	. 4	1. 9	1. 5	. 4	11. 9	8. 5	3. 4	16. 0
1967	3. 8	10. 3	9. 7	. 6	3. 1	2. 7	. 4	1. 8	1. 4	. 4	11. 6	8. 2	3. 4	15. 9
1968	4. 0	11. 4	10. 8	. 6	3. 3	2. 9	. 4	1. 9	1. 5	. 4	11. 8	8. 2	3. 6	16. 8
1969	4. 3	11. 5	11. 0	. 5	3. 4	3. 0	. 4	2. 3	1. 9	. 4	12. 9	8. 9	4. 0	18. 6
1970	4. 3	11. 3	10. 8	. 5	3. 1	2. 8	. 3	2. 2	1. 9	. 3	12. 8	8. 8	4. 0	18. 3
1971	NA	12. 8	12. 3	. 5	3. 5	3. 2	. 3	NA	NA	NA	12. 4	8. 3	4. 1	17. 9

[1] Excluding Labrador, Yukon, and Northwest Territories.

Sources: 1950–68 (except woodpulp). Manning, Glenn H., and H. Rae Grinnell. *Forest resources and utilization in Canada to the year 2000.* Dept. of the Environment, Canadian Forestry Serv. Publ. 1304, 80 p. Ottawa, Ont. 1971. 1969–71 (except woodpulp). *Statistics—Canada, Annual Census of Manufactures.* Woodpulp—American Paper Institute, Inc. *Wood pulp statistics.*

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[6] Manning, Glenn H. The utilization of wood residue in Canada. Canadian Forestry Serv., Forest Econ. Res. Inst. Ottawa. 1972.

TABLE 110.—*Timber harvest in Canada, 1970, and estimated allowable annual timber cut, by Province* [1]

[Million cubic feet]

Region	Actual 1970 production			Annual allowable cut [2]					
				Gross physical			Economic [3]		
	Total	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Softwood	Hardwood
British Columbia	1,933	1,922	12	3,351	3,321	30	2,950	2,935	15
Prairie Provinces	275	247	28	1,650	1,040	610	1,155	728	427
Ontario	593	468	125	2,626	1,333	1,293	1,534	718	816
Quebec	1,021	854	167	2,249	1,837	412	1,592	1,350	242
Atlantic Provinces	464	416	48	866	649	217	760	570	190
Total	4,285	3,905	380	10,742	8,180	2,562	7,991	6,301	1,690

[1] Excluding Labrador, Yukon, and Northwest Territories.

[2] On nonreserved inventoried public and private forest land (506.9 million acres). Some 272.4 million acres had not been inventoried in 1968. Three-quarters of this noninventoried acreage is located in Labrador, Yukon, and Northwest Territories. Includes timber on immature acreage in British Columbia.

[3] The annual allowable cut on acres physically accessible or becoming so which could be utilized under June 1972 cost price levels for lumber and plywood and somewhat improved prices for pulp and newsprint.

Sources: British Columbia Council of Forest Industries. *Canada's forest resources and forest products potentials.* Vancouver, B.C. 1972.

Manning, Glenn H., and H. Rae Grinnell. *Forest resources and utilization in Canada to the year 2000.* Dept. of the Environment, Canadian Forestry Serv. Publ. 1304, 80 p. Ottawa, Ont. 1971.

TABLE 111.—*Production of selected timber products in Canada, 1970, with projections to 2000*

Year	Lumber			Plywood (⅜-inch basis)			Paper and board			Woodpulp	Total timber cut
	Total	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Newsprint	Other		
	Billion board feet	*Billion board feet*	*Billion board feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Million tons*	*Million tons*	*Million tons*	*Million tons*	*Billion cu. ft.*
1970	11.3	10.8	0.5	2.1	1.9	0.2	12.8	8.8	4.0	18.3	4.3
1980	14.5	13.8	.7	4.3	3.2	1.1	16.9	10.8	6.2	21.9	5.4
1990	17.4	16.6	.8	6.4	4.4	1.9	22.4	13.2	9.2	28.5	6.2
2000	20.1	19.3 [1] (24.0)	.9	8.8	6.1 [1] (3.8)	2.6	27.4	15.3	12.1	35.2	9.1

[1] Numbers in parentheses are projections of softwood lumber and plywood production in 2000 prepared by the Council of Forest Industries of British Columbia. *Canada's forest services and forest product pontentials.* June 1972.

Source: Manning, Glenn H., and H. Rae Grinnell. *Forest resources and utilizztion in Canada to the year 2000.* Dept. of the Environment, Canadian Forestry Serv. Publ. 1304, 80 p. Ottawa, Ont. 1971.

exports to the United States could be increased substantially.

Attainment of the total allowable cut in Canada, along with related exports of timber products to the United States will of course depend upon a number of economic and related factors. The remoteness and low-yield capability of some forest land, particularly in areas not yet allocated to timber production, may make it uneconomical to operate without substantial price increases. The fact that roughly a fourth of the allowable cut is aspen and other hardwoods, not as readily marketable as softwoods, may also slow development. Nevertheless, as the world timber supply situation becomes tighter, as seems likely, these less desirable resources may also become economically available.

It is also possible that additional areas of forest may be set aside in wilderness-type areas in Canada as in the United States. Many private lands in Canada, although of limited importance compared with public ownerships, may be held for nontimber purposes. A study in southwest Quebec, for example, showed that about a quarter of the owners did not reside on the land and were more interested in recreation and land speculation than in timber growing.[7] U.S. experience also suggests that the acreage considered loggable may shrink to some degree in the years ahead as unstable lands and areas with difficult and costly regeneration problems or low productivity are identified and withdrawn from cutting.

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[7] Jones, A. R. C., and R. H. Lord. The private woodlot of southwest Quebec. Canadian Forestry Serv. Inf. Rpt. E–X–5. 1969.

Whether allowable cuts can be sustained in the longrun after virgin forests are liquidated also is an unanswered question that depends in large part on the level of forest management and protection in the coming decades.

Utilization Trends

As an offset to possible constraints on timber harvesting, improvements in utilization may tend to increase availability of timber products. British Columbia, for example, has been particularly successful in obtaining close utilization of much of the timber harvested, thus providing a basis for major expansion and sustained production of both lumber and pulp products.[8]

New developments such as installation of chipping headrigs also appear likely to lead to increased production of lumber from eastern Canadian forests that have long been considered suitable and available only for pulpwood.

Exports to the United States

Since World War II, the United States has been Canada's principal timber export market. In 1972 nearly 9 billion board feet of Canadian lumber, or more than half of Canada's total lumber production, was shipped to the United States. The 10.4 million tons of pulp, paper, and paperboard exported to the United States in 1971 represented about six-tenths of Canada's total production.

Demands for timber products are growing rapidly in all countries of the world, however, including the major consuming and timber deficit countries of western Europe and Japan. Thus, competition for Canadian timber products could increase significantly in future years. Nonetheless, projections based on available studies and judgment point to a substantial increase in Canadian timber product exports to the United States. For example, with relative prices of lumber averaging 30 percent above 1970, U.S. imports of softwood lumber have been estimated to rise to 12 billion board feet by 2000. With relative prices of paper and board 10 percent above 1970, U.S. imports of pulpwood, pulp, paper and board—essentially all from Canada—are projected to rise to 2.2 billion cubic feet, roundwood equivalent, by 2000.

POTENTIAL SUPPLIES OF TROPICAL WOODS

Tropical hardwood forests are important to the United States as sources of hardwood plywood, veneer, lumber, and logs, and as potential sources of pulp products. In the past about 70 percent of world timber trade in these hardwood timber products has originated in southeast Asia, with lesser amounts from Africa and from Canada and Latin America. This is in sharp contrast to the distribution of tropical timber resources.

Tropical forests are extensive and have a large capacity for timber growing but there are serious questions as to the ability of these forests to continue to supply high-quality timber products to world markets.[9]

Much of the tropical forest area is relatively inaccessible and development of timber resources is slow and expensive. Utilization of timber is also complicated by the great numbers of species of widely different characteristics. In just one Amazon type, for example, 50 percent of the volume was found to be in 35 species, with the other 50 percent in more than 100 additional species. Such problems of heterogeneity are less severe in Africa and least in southeast Asia but occur in all regions.

Determining the characteristics of the many different tropical hardwood species, and developing markets for them, are formidable tasks that have not yet been accomplished.

The problems of tropical forests are further complicated by the continuing search for agricultural land to accommodate rapidly expanding populations. In the Far East an estimated 21 million acres of tropical forest are reported to be cleared annually. In the Philippines, it was found that land clearing was destroying three times as much wood as was being logged for timber products.[10] Similar expansion of agriculture is occurring in forest areas in Africa and Latin America. Studies in Indonesia also indicate that after allowances for agricultural development and reservations for watersheds, only 24 percent of the total forest area was considered suitable for permanent forest production.[11]

Much of the tropical forest, moreover, consists of low-quality stands with limited utility for timber production, and much land logged or cleared for agriculture reverts to such stands. It is possible that many presently commercial species will disappear in this process, and some ecologists are in fact describing the natural tropical rain forest as a nonrenewable resource.

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[8] British Columbia Forest Service. Annual report, 1969. Victoria, B.C. 1970.

[9] Food and Agriculture Organization of the United Nations. Wood: World trends and prospects. Unasylva, Vol. 20(1–2), nos. 80–81, 136 p. 1966.

——— Timber trends and prospects in Africa. 90 p. Rome. 1967.

——— Latin American timber trends and prospects. 117 p. New York. 1963.

——— Timber trends and prospects in the Asia-Pacific Region. 224 p. Geneva. 1961.

[10] Food and Agriculture Organization of the United Nations. Wood: World trends and prospects. Unasylva, Vol. 20(1–2), nos. 80–81, 136 p. 1966.

[11] Payne, Burnett H., and David Nordwall. A review of certain aspects of the forestry program and organization in Indonesia. USDA Foreign Econ. Dev. Serv. and Forest Serv. cooperating with U.S. Agency for Int. Dev. 1971.

Timber management of tropical forests also is limited, partly because of custom, lack of capital for forest replacement, and lack of knowledge concerning regenerative processes and cultural requirements of timber species in the tropical rain forest.[12]

Thus in the longer run there are serious questions as to whether the world can continue to draw heavily on the tropics for fine, high-quality logs. Utilization has tended to be highly selective, both as to species and sizes of trees cut, and supplies of such preferred timber are diminishing. In West Malaysia, for example, four-fifths of the forest resource available to wood-based plants which do not have timber concessions has been logged over at least once, and supplies of high-grade logs on the open market are in seriously short supply.[13]

The tropical wood industries are nevertheless still expanding and it seems likely that the output of hardwood logs, plywood, veneer, and lumber from natural forests of the Tropics will increase over the next few decades, particularly in Southeast Asia. Pringle, for example, has estimated that exports of hardwood products from the Tropics in 1985 will be about twice as high as in 1967.[14] The projections for hardwood timber products therefore show sizable increases in imports of plywood and veneer, and some increases for lumber.

The United States has been importing small volumes of tropical hardwood timber products from Mexico, along with some softwood. Although these imports have been declining, Mexico has sufficient timber resources of both hardwoods and softwoods to support an increase in timber harvests and exports.

POTENTIAL TIMBER SUPPLIES FROM TROPICAL AND SUBTROPICAL PLANTATIONS

Plantations of softwoods and some hardwoods in tropical and subtropical areas can be expected to become increasingly important in the next few decades, particularly in supplying pulping and construction materials. Very high growth rates are being achieved by planting and cultivating fast-growing species of pines, eucalyptus, and other species. Both softwood pulpwood and saw logs of acceptable size can be produced in relatively short rotations.

Plantations in New Zealand, South Africa, and Latin America, for example, are supporting substantial production of pulp and lumber for local markets and for export, and planting programs are being expanded in these and other countries. Availablility of capital has been a limiting factor in such expansion and major impacts on the world timber demand-supply situation, therefore, may not be felt for some time to come.

Teak plantations also are important in Indonesia and Burma, with a reported area in 1967 of about 2.5 million acres.[15] Plantations offer no easy answer to increasing supplies of most preferred hardwood species as there is much yet to be learned about the establishment and management of such stands. But expansion of plantations could help offset declines in supplies of choice species from natural hardwood forests.

POTENTIAL TIMBER SUPPLIES FROM THE USSR

The Soviet Union has about one-third of the productive forests in the world—a greater forest area than North America and Europe combined. Also, most of the forest land in the USSR supports softwood timber.

Harvests of industrial roundwood in the USSR in 1967–69 amounted to 10.2 billion cubic feet—about 18 percent of the total world output (table 106). Exports of timber products in the same year amounted to some 1.1 billion cubic feet, roundwood equivalent. Lumber accounted for nearly half of these exports. Substantial volumes of logs also were exported to Japan and some pulpwood to European countries.

An estimated 737 million acres of forest land in the USSR have been classed as unsuitable for commercial use because of low sites or inoperable conditions.[16] On approximately 800 million acres cutting has not reached harvest potentials. These are the acres that hold promise for achieving an estimated allowable harvest of roughly 18 billion cubic feet annually.

Population and timber industries are primarily concentrated in the southern and western parts of the USSR, and forests in these regions, amounting to an estimated 157 million acres. have been heavily overcut as a consequence.[17] The bulk of unexploited forest resources now lies in northern Russia and Siberia.

The USSR has been engaged in a major effort to transfer timber harvests to timber surplus areas and to establish pulp, paper, lumber, and plywood plants close to new supply sources.

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[12] Lamb, Bruce. Tropical American forest resources. Conference on Tropical Hardwoods Proc. New York State College of Forestry, Syracuse. 1969.

[13] Food and Agriculture Organization of the United Nations. The wood based industries of West Malaysia. FOD: SF/MAL 68/516, Tech. Rpt. 4. 1971.

[14] Pringle, S.L. World supply and demand of hardwoods. Conference on Tropical Hardwoods Proc. New York State College of Forestry, Syrcause, N.Y. 1969.

[15] Food and Agriculture Organization of the United Nations. Wood: World trends and prospects. FFHC Basic Study 16, 131 p. Rome. 1967.

[16] Solecki, J. S. Russia-China-Japan, economic growth, resources and forest industries. British Columbia Univ. Victoria, B. C. 1967.

[17] Algvere, Karl Viktor. Forest economy in the USSR. Studia Forestalia Suecica, Nr. 39. Royal College of Forestry, Stockholm, Sweden. 1966.

This program has faced varied difficulties such as the long distances between forests and markets. In spite of remoteness of much forest land, low productivity of many sites, and newly recognized environmental questions, there are undoubtedly opportunities for large increases in timber harvests in the next several decades. Exports of lumber and logs are expected to continue to increase, although growing domestic needs and declining resource availability in European Russia may constrain this trade in the longer run.

Pulp and paper production in the Soviet Union has also grown rapidly during the past two decades, with almost all of this production being used domestically. The current low per capita consumption of paper products, and difficulties experienced in meeting planned production increases suggest that the Soviet Union is not likely to become a major supplier of pulp products to foreign markets for some time to come.

A SUMMARY OF PROSPECTIVE TRENDS IN U.S. TIMBER IMPORTS AND EXPORTS

In spite of growing world demands for timber products, it has been estimated in this study that potentials for increased harvests, especially in Canada and the tropical hardwood regions, are sufficient to provide significant increases in U.S. imports of timber products in the years immediately ahead. With prices averaging 30 percent above the 1970 level, for example, total projected imports rise from 2.9 billion cubic feet, roundwood equivalent, in 1972 to 4.7 billion cubic feet by the year 2000 (tables 112 and 113).

The largest increases in imports are expected in lumber and pulp and paper products from Canada. It also seems likely that the United States will draw somewhat more heavily on tropical forests for some time to come in spite of the uncertainties surrounding the long-term outlook.

Along with rising imports it also appears likely that exports of some U.S. timber products will increase somewhat as a result of expanding world markets (tables 112 and 113). Kraft pulp and paper products are expected to represent the bulk of increased exports. Some increases in exports of logs and chips also have been assumed, although it is of course possible that nonmarket factors outside the basic assumptions of this study might lead to restrictions on exports of these raw materials.

Looking some decades into the future, there are two possibilities that appear to be of particular importance in the long-run timber outlook:

- With the tightening of the timber supply situation that is in prospect, the United States will surely find it increasingly difficult to supply wood products to other nations.
- Output of wood products in timber surplus countries may drop following the liquidation of accessible old-growth. In such case the United States may not be able to maintain the levels of timber imports temporarily achieved. Such possibilities could be deferred by development of forests in the USSR to supply more of the world timber market, by major expansion of plantations, and by greater use of the less desirable timber species in tropical forests. For the long run a question still remains, whether anticipated timber demands of the world can be supplied in the absence of a substantial improvement in forest management.

Projections of net timber imports developed under the assumptions of this study continue to rise over the next several decades and offer a partial solution to U.S. timber supply-demand problems. Other alternatives for increasing timber supplies from U.S. forests, and for obtaining closer utilization of available timber, also are of large importance in improving the timber outlook as indicated in other chapters of this report.

TABLE 112.—*Imports and exports of selected timber products, 1970–72, with projections under alternate price assumptions (medium projections of growth in population and economic activity) to 2000*

IMPORTS

Price assumption and year	Lumber		Hardwood plywood	Pulp	Paper and board	Logs	
	Softwoods	Hardwoods				Softwoods	Hardwoods
	Billion board feet, lumber tally	*Billion board feet, lumber tally*	*Billion square feet, 3/8-inch basis*	*Million tons*	*Million tons*	*Billion board feet, International 1/4-inch log rule*	*Billion board feet, International 1/4-inch log rule*
1970	5.8	0.3	2.0	3.5	7.2	0.1	(1)
1971 [2]	7.2	.4	2.5	3.5	7.6	.1	(1)
1972 [2]	9.0	.4	3.2	2.7	7.9	(1)	(1)
1970 RELATIVE PRICES							
1980	7.0	.4	3.5	4.0	8.0	.1	0.1
1990	7.0	.4	3.5	4.0	8.0	.1	.1
2000	7.0	.4	3.5	4.0	8.0	.1	.1
RISING RELATIVE PRICES [3]							
1980	9.5	.5	3.3	6.0	10.5	.1	.1
1990	12.0	.7	3.9	7.5	12.5	.1	.1
2000	13.0	.9	4.2	8.5	13.5	.1	.1
RELATIVE PRICES ABOVE 1970 AVERAGES [4]							
1980	10.5	.6	4.1	6.0	10.5	.1	.1
1990	12.0	.6	4.2	7.0	11.5	.1	.1
2000	12.0	.6	4.3	7.5	12.0	.1	.1

EXPORTS

Price assumption and year	Lumber		Hardwood plywood	Pulp	Paper and board	Logs	
	Softwoods	Hardwoods				Softwoods	Hardwoods
1970	1.2	.1	.1	3.1	2.7	3.4	
1971 [2]	.9	.2	(5)	2.2	3.0	2.8	.1
1972 [2]	1.2	.3	(5)	2.2	3.0	3.8	.1
1970 RELATIVE PRICES							
1980	1.2	.1	(5)	3.5	3.5	4.5	.1
1990	1.2	.1	(5)	3.5	3.5	4.5	.1
2000	1.2	.1	(5)	3.5	3.5	4.5	.1
RISING RELATIVE PRICES [3]							
1980	1.2	.1	(5)	3.5	3.5	4.5	.1
1990	1.2	.1	(5)	3.5	3.5	4.5	.1
2000	1.2	.1	(5)	3.5	3.5	4.5	.1
RELATIVE PRICES ABOVE 1970 AVERAGES [4]							
1980	1.2	.1	(5)	3.5	3.5	4.5	.1
1990	1.2	.1	(5)	3.5	3.5	4.5	.1
2000	1.2	.1	(5)	3.5	3.5	4.5	.1

[1] Less than 50 million board feet.

[2] Preliminary.

[3] Relative prices rising from 1970 trend levels as follows: lumber—1.5 percent per year; plywood—1.0 percent per year; and paper and board—0.5 percent per year.

[4] Relative prices of lumber and plywood—30 percent, and paper and board—10 percent above their 1970 averages.

[5] Less than 500 million square feet.

Sources: 1970, 1971, and 1972—U.S. Department of Commerce, Bureau of the Census. *U.S. Exports—schedule B, commodity and country.* FT 410 (monthly); and *U.S. imports—general and consumption, schedule A, commodity and country.* FT 135 (monthly).

Projections: U.S. Department of Agriculture, Forest Service.

TABLE 113.—*Imports and exports of timber products 1970–72, with projections under alternate price assumptions (medium projections of growth in population and economic activity) to 2000*

[Roundwood equivalent]

Year	Total				Lumber			Plywood			Pulp products[1]			Logs		
	Imports	Exports	Net imports		Imports	Exports	Net imports	Imports	Exports	Net imports	Imports	Exports	Net imports	Imports	Exports	Net exports
			Volume	Percent of U.S. consumption												
	Billion cubic feet	*Billion cubic feet*	*Billion cubic feet*	*Percent*	*Billion cubic feet*	*Billion cubic feet*	*Billion cubic feet*	*Billion cubic feet*	*Billion cubic feet*	*Billion cubic feet*	*Billion cubic feet*	*Billion cubic feet*	*Billion cubic feet*	*Billion cubic feet*	*Billion cubic feet*	*Billion cubic feet*
1970	2.4	1.4	1.1	8.4	0.9	0.2	0.8	0.2	(2)	0.2	1.3	0.7	0.6	(2)	0.4	0.4
1971[3]	2.7	1.2	1.6	11.6	1.2	.2	1.0	.2	(2)	.2	1.3	.6	.7	(2)	.4	.3
1972[3]	2.9	1.3	1.6	11.6	1.5	.2	1.2	.3	(2)	.2	1.2	.6	.6	(2)	.5	.5
PROJECTIONS																
1970 RELATIVE PRICES																
1980	2.7	1.9	.8		1.1	.2	.9	.2	(2)	.2	1.4	1.0	.4	(2)	.7	.7
1990	2.7	1.9	.8		1.1	.2	.9	.2	(2)	.2	1.4	1.0	.4	(2)	.7	.7
2000	2.7	1.8	.7		1.1	.2	.9	.2	(2)	.2	1.4	.9	.5	(2)	.7	.7
RISING RELATIVE PRICES[4]																
1980	3.6	1.9	1.7		1.5	.2	1.3	.2	(2)	.2	1.9	1.0	.9	(2)	.7	.7
1990	4.1	1.9	2.2		1.6	.2	1.4	.2	(2)	.2	2.3	1.0	1.3	(2)	.7	.7
2000	4.7	1.8	2.9		1.9	.2	1.7	.3	(2)	.3	2.5	.9	1.6	(2)	.7	.7
RELATIVE PRICES ABOVE 1970 AVERAGES[5]																
1980	3.8	1.9	1.9		1.6	.2	1.4	.3	(2)	.3	1.9	1.0	.9	(2)	.7	.7
1990	4.2	1.9	2.3		1.8	.2	1.6	.3	(2)	.3	2.1	1.0	1.1	(2)	.7	.7
2000	4.3	1.8	2.5		1.8	.2	1.6	.3	(2)	.3	2.2	.9	1.3	(2)	.7	.7

[1] Includes pulpwood and the pulpwood equivalent of pulp, paper, and board.

[2] Less than 50 million cubic feet.

[3] Preliminary.

[4] Relative prices rising from 1970 trend levels as follows: lumber—1.5 percent per year; plywood—1.0 percent per year; paper and board—0.5 percent per year.

[5] Relative prices of lumber and plywood—30 percent, and paper and board—10 percent above their 1970 averages.

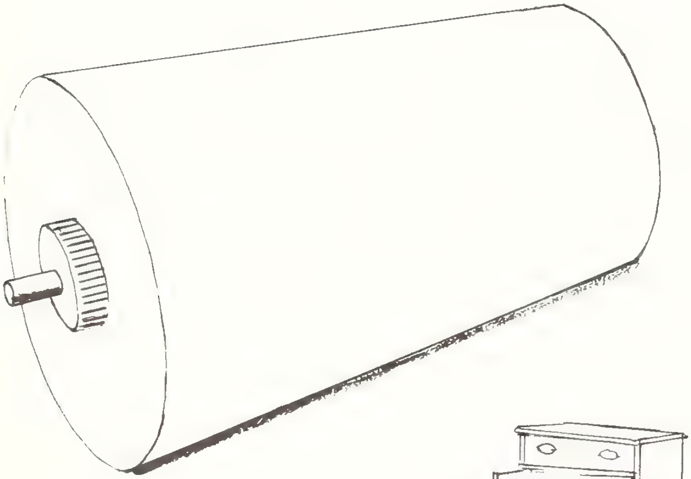
NOTE: Data may not add to totals because of rounding.

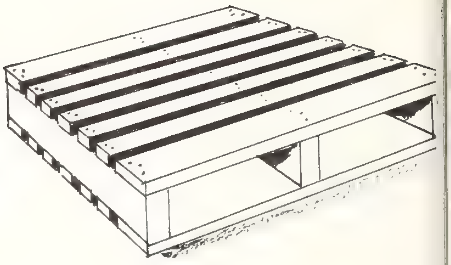
Sources: 1970, 1971, 1972—U.S. Department of Commerce, Bureau of the Census. *U.S. imports, genera and consumption, schedule A, commodity and country.* FT 135 (Monthly); and *U.S. exports, schedule B, commodity and country.* FT 410 (Monthly).

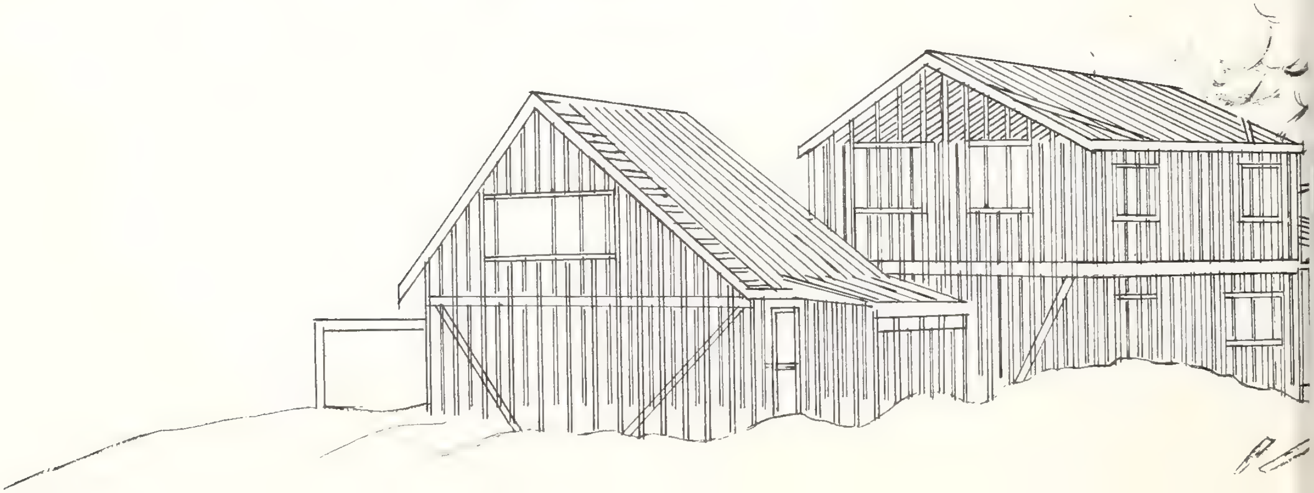
Projections: U.S. Department of Agriculture, Forest Service.

CHAPTER V

DEMAND FOR TIMBER PRODUCTS







This chapter presents information on recent trends in consumption of timber products, together with projections of potential demands to the year 2000.

The projections of demand indicate the volumes of timber products likely to be consumed under specified or implied assumptions on population and economic growth, technological and institutional changes, and trends in prices of timber products relative to the general price level and to most competitive materials.[1]

BASIC ASSUMPTIONS

In partial recognition of uncertainty, projections of timber demand have been prepared using three alternative assumptions on population and economic growth. The medium projections of demand have also been presented under three alternative price assumptions. Development of these alternative projections was designed to aid in the evaluation of timber demand-supply-price relationships in the last chapter of this report.

Population Assumptions

Changes in population have an important effect on the demand for many products such as houses, furniture, and paper. Population changes also influence the size of the labor force, a major determinant of the level of economic activity and related materials usage.

During the five decades 1920–70, the population of the United States increased by nearly 100 million persons, rising at an average annual rate of 1.3 percent (table 114, fig. 49; Append. V, table 1).

Recent projections of the Bureau of the Census[2] indicate that population is likely to continue to grow fairly rapidly through the projection period. The medium projection used in this study shows population rising to 281 million in 2000 (table 114, fig. 49)—slightly above the median of the series of projections published by the Bureau of the Census in its 1972 report. The annual rate of population growth represented by this projection gradually declines from 1.1 percent in the 1970's to 1.0 percent in the 1990's.

Population 1920 - 70, with projections to 2000

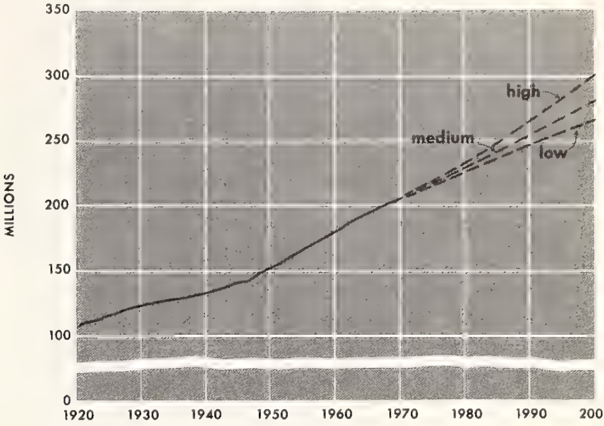


Figure 49

Projections of population shown in table 114 are substantially lower than similar Census projections made in 1964[3] and used in the preceding appraisal of the timber situation made by the Forest Service.[4] The medium projection in the 1964 Census report, for example, indicated a population of 326 million in 2000.

Fertility rates.—The revised population series used in this study reflect significant reductions in Census Bureau assumptions regarding future fertility rates. There have been large fluctuations in fertility rates in recent decades, as illustrated in figure 50, but since the late 1950's the trend

Total fertility rates 1920 - 68, with projections to 2000

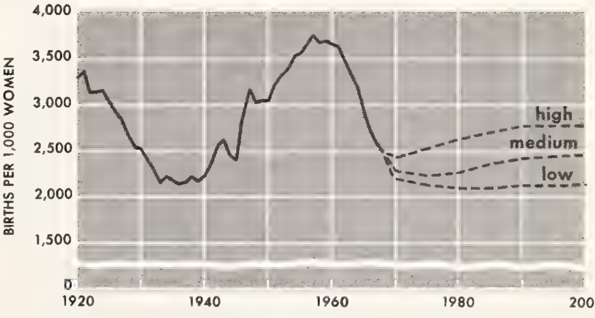


Figure 50

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[1] For a more complete discussion of the nature and meaning of longrun projections of demand for timber products, problems involved in making projections, principal determinants of demand, models for making projections, and uses of projections, see Folia Forestalis 101. Forecasting in forestry and timber economy, preliminary report. IUFRO, Section 31, Working Group 4. 49 p. Metsantukimullaitos, Institutum Forestale Fenniae, Helsinki, Finland. 1971.

[2] U.S. Department of Commerce, Bureau of the Census. Projections of the population of the United States, by age and sex (interim revisions): 1970 to 2020. Cur. Pop. Reps. Ser. P–25, No. 448, 50 p. 1970.

——— Projections of the population of the United States, by age and sex: 1970 to 2020. Cur. Pop. Reps. Ser. P–25, No. 470, 56 p. 1971.

——— Projections of the population of the United States, by age and sex: 1972 to 2020. Cur. Pop. Reps. Ser. P–25, No. 493, 26 p. 1972.

[3] U.S. Department of Commerce, Bureau of the Census. Projections of the population of the United States, by age and sex: 1964 to 1985 with extensions to 2010. Cur. Pop. Reps. Ser. P–25, No. 286. 1964.

[4] U.S. Department of Agriculture, Forest Service. Timber trends in the United States. Forest Resource Rep. 17, 235 p. 1965.

TABLE 114.—*Measures of population and economic growth, selected years 1920–72, with projections to 2000*

Year	Population		Gross national product [1]		Per capita gross national product		Disposable personal income [1]		Per capita disposable personal income		Index of manufacturing production	
	Millions	*Annual rate of increase*	*Billions of 1967 dollars*	*Annual rate of increase*	*1967 dollars*	*Annual rate of increase*	*Billions of 1967 dollars*	*Annual rate of increase*	*1967 dollars*	*Annual rate of increase*	*1967=100*	*Annual rate of increase*
1920	106.5	----------	160.5	----------	1,507	----------	----------	----------	----------	----------	16.2	----------
1925	115.8	1.7	201.8	3.2	1,743	3.0	----------	----------	----------	----------	19.8	4.1
1930	123.2	1.2	215.8	1.4	1,752	.1	159.1	----------	1,391	----------	18.7	−1.1
1935	127.4	.7	199.3	−1.6	1,564	−2.3	150.8	−1.1	1,184	−1.7	18.0	−.8
1940	132.6	.8	267.1	3.3	2,014	5.2	190.3	4.8	1,435	3.9	25.4	7.1
1945	140.5	1.2	417.6	3.5	2,972	8.1	262.8	6.7	1,870	5.4	42.6	10.9
1950	152.3	1.6	417.8	.1	2,743	−1.6	285.6	1.7	1,875	.1	45.0	1.1
1955	165.9	1.7	515.0	4.3	3,104	2.5	339.4	3.5	2,046	1.8	58.2	5.3
1960	180.7	1.7	573.4	2.2	3,173	.4	389.2	2.8	2,154	1.0	65.4	2.4
1965	194.3	1.5	726.4	4.8	3,739	3.3	497.7	5.0	2,562	3.5	89.1	6.4
1966	196.6	1.2	773.8	6.5	3,936	5.3	525.0	5.5	2,670	4.3	98.3	10.3
1967	198.7	1.1	793.9	2.6	3,995	1.5	546.3	4.0	2,749	3.0	100.0	1.7
1968	200.7	1.0	830.8	4.7	4,140	3.6	570.8	4.5	2,844	3.4	105.7	5.7
1969	202.7	1.0	853.2	2.7	4,209	1.7	587.6	2.9	2,899	1.9	110.5	4.5
1970	204.9	1.1	849.0	−.5	4,143	−1.5	610.0	3.8	2,977	2.7	106.6	−3.7
1971	207.0	1.1	872.1	2.7	4,213	1.6	634.6	4.0	3,066	2.9	106.8	.2
1972	208.8	.9	928.3	6.4	4,446	5.5	662.0	4.3	3,170	3.4	114.4	7.1
Low projections												
1980	226	1.0	1,240	3.5	5,500	2.5	850	3.5	3,740	2.5	150	3.5
1990	248	.9	1,750	3.5	7,080	2.5	1,190	3.5	4,810	2.6	210	3.4
2000	266	.7	2,480	3.5	9,310	2.8	1,680	3.5	6,330	2.8	290	3.3
Medium projections												
1980	228	1.1	1,310	4.0	5,730	2.9	890	4.0	3,890	2.9	160	4.1
1990	255	1.1	1,930	4.0	7,580	2.8	1,310	4.0	5,160	2.8	230	4.0
2000	281	1.0	2,860	4.0	10,180	3.0	1,950	4.0	6,930	3.0	340	3.9
High projections												
1980	232	1.3	1,370	4.5	5,910	3.2	930	4.5	4,020	3.2	170	4.7
1990	266	1.4	2,130	4.5	8,000	3.1	1,450	4.5	5,440	3.1	260	4.6
2000	301	1.2	3,300	4.5	10,970	3.2	2,250	4.5	7,470	3.2	410	4.5

[1] The 1970 trend level for the gross national product ($882 billion) and disposable personal income ($600 billion) were used as the base for calculating the projected values.

NOTE: Annual rates of increase are calculated for 5-year periods from 1920 through 1965, for 1-year periods 1965 through 1972, and for 10-year periods 1970 through 2000.

Sources: Population, U.S. Department of Commerce, Bureau of the Census. 1920–45—*Population estimates and projections.* Cur. Pop. Reps. Ser. P–25, No. 442. 1970; 1950–70—*Estimates of the population of the United States to December 1, 1971.* Cur. Pop. Reps. Ser. P–25, No. 474. 1972; 1971–72—*Estimates of the population of the United States to January 1, 1973.* Cur. Pop. Reps. Ser. P–25, No. 496. 1973; 1980–2000—*Projections of the population of the United States, by age and sex (interim revisions): 1970 to 2020.* Cur. Pop. Reps. Ser. P–25, No. 448. 1970.

Gross national product and per capita gross national product derived from data published in the following sources: 1920–25—U.S. Congress, Joint Committee on the Economic Report. *Potential economic growth of the United States during the next decade.* 83rd Cong., 2d sess. 1954; 1930–67 and 1968–71—U.S. Department of Commerce, Social and Economic Statistics, Bureau of Economic Analysis. *Survey of current business.* 52(7). July 1972; 1930–72—Council of Economic Advisers. *Economic report of the President.* January 1973.

Disposable personal income and per capita disposable personal income derived from data published in the following source: 1930–72—Council of Economic Advisers. *Economic report of the President.* January 1973.

Index of manufacturing production derived from data published in the following sources: 1920–25—Federal Reserve System. *Industrial production 1957–1959 base.* 1962; 1930–70—Council of Economic Advisers. *Economic report of the President.* January 1972; 1971–72—U.S Department of Commerce, Social and Economic Statistics, Bureau of Economic Analysis. *Survey of current business.* 53(3). March 1973.

has fallen sharply.[5] The prevailing fertility rate in the period 1968–70 would result in a population close to the medium projection used in this study. The much lower fertility rates of 1971 and 1972, would result in a population less than the low projection shown in figure 49.

Immigration.—The allowance for immigration, in the Census Bureau projections of future population growth averages 400,000 net immigrants per year between 1970 and 2000—a significant part of the total population growth in the medium projection. Reductions in immigration, and thus in projected population growth, could result from mounting national concern about population size and environmental impacts.

Gross National Product Assumptions

Changes in the consumption of many timber products, as well as other industrial materials, have been closely associated in recent decades with changes in the Nation's gross national product, i.e., the value of all goods and services produced. In developing a number of the timber product projections shown in this chapter, pro-

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[5] These fertility rates indicate the number of births per 1000 women during their child bearing years. For a more detailed technical definition, see U.S. Department of Health, Education, and Welfare; Public Health Service. Natality Statistics Analysis United States, 1965–67. National Center for Health Statistics, Ser. 21, No. 19, 38 p. 1970.

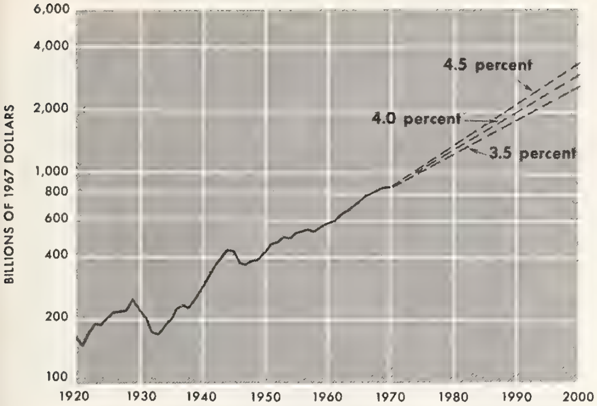
Gross national product 1920 - 70, with projections to 2000

Figure 51

jected changes in the gross national product have been used as a principal indicator of changes in demand.

Between 1920 and 1970, the gross national product, measured in constant 1967 dollars, increased more than five times—rising at an average annual rate of 3.4 percent (table 114, fig. 51; Append. V, table 1). Annual changes have fluctuated widely, from as much as +16.1 percent to −14.8 percent (fig. 52). The highest sustained rates of growth in gross national product occurred in the 1960's, when growth averaged 4.5 percent per year.

The wide fluctuations in annual rates of growth in the gross national product have reflected such factors as differences in the rates of change in labor force, rates of unemployment, hours worked per year, and productivity. Cyclical factors will presumably continue to cause fluctuations in gross national product in the years ahead. But for this study only trends in growth were considered, using three different rates of growth: 3.5 percent, 4.0 percent, and 4.5 percent.

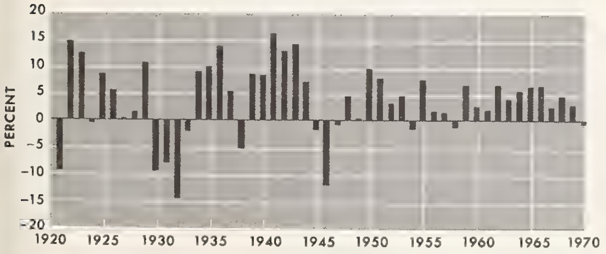
Annual percentage change in gross national product 1920 - 70

Figure 52

Basis for gross national product projections.—These differences in assumed growth rates for gross national product partly reflect the different assumptions on population growth and the related size of the labor force. Thus, the highest rate of growth in gross national product is associated with the high projection of population. However, most of the difference in projected rates is due to underlying assumptions on trends in productivity of the labor force.

Given a continuation of recent trends in labor force participation rates and hours worked per year, and an unemployment rate of 4 percent, the implied rates of increase in productivity in the private economy underlying the gross national product projections are about 3.0 percent, 3.4 percent, and 3.8 percent respectively. In the 1960's productivity in the private economy increased about 3.6 percent per year.

The medium assumed rate of growth would result in a gross national product of $1,310 billion in 1980—some 54 percent above that of 1970 (table 114). By 2000 this projection would reach $2,860 billion—some 3.4 times that of 1970. The associated projection of per capita gross national product in 2000 rises to $10,180—nearly 2.5 times the 1970 average.

The projections of gross national product used in this study are substantially higher than those used in earlier appraisals of the timber situation by the Forest Service. For example, the medium projection of gross national product in 1980 is about 15 percent above that used in the preceding timber appraisal published in 1965.[6] However, it is close to recent projections made by the Bureau of Labor Statistics,[7] the National Planning Association,[8] and the National Industrial Conference Board.[9]

Disposable personal income.—This measure of income available for spending or saving by the Nation's population is another important indicator of the demand for certain products such as furniture and various grades of paper and board. It also has a significant influence on household formation and size of dwellings.

Since 1950, disposable personal income has equaled about 68 percent of the gross national product. This historical and rather constant relationship was assumed to continue through the projection period (table 114).

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[6] *Op. cit.* Timber trends in the United States.

[7] U.S. Department of Labor, Bureau of Labor Statistics. Patterns of U.S. economic growth. Bull. 1672. 1970.

[8] National Planning Association. The technique of long-range economic projections. Projection Highlights, Vol. 1, No. 5. Washington, D.C. 1970.

——— The U.S. economy in the coming decade. Projection Highlights, Vol. 2, No. 10. Washington, D.C. 1972.

[9] National Industrial Conference Board. Economic growth in the seventies. Washington, D.C. 1970.

Manufacturing activity.—Future changes in manufacturing—a major wood-using sector of the U.S. economy—will also be important in determining the demand for some timber products. In the past several decades the index of manufacturing production published by the Federal Reserve Board,[10] has shown a fairly consistent upward trend, and close relationship to changes in the gross national product (figs. 53 and 54).

The medium projections based on the historical trends and relationships show an increase in manufacturing production by 2000 to about 3.2 times the 1970 level.

Rates of growth in projections of manufacturing production, and in construction activity discussed later in this chapter, decline over the projection period. Transportation, trade, and other services account for a growing share of the projected gross national product, as in the past. In the period 1950–68, for example, the portion of the gross national product originating in these sectors rose from 46.5 to 49.6 percent.

The projections of manufacturing activity and construction adopted in this study rest on the assumption that the U.S. economy will continue to be oriented largely to production of economic goods, and that adequate supplies of raw materials and energy sources will be available to support such sustained growth over the next three decades.

Both of these assumptions are being increasingly challenged,[11] and for the longrun it is difficult to conceive of an indefinite continuation of high geometric growth rates. Also, concern over environmental factors could affect the types of goods produced, rates of productivity in manufacturing, and rates of increase in gross national product. For the projection period used in this study, however, it was assumed that the economic growth assumptions adopted provide an acceptable basis for evaluation of potential timber demands.

Index of manufacturing production 1920 - 70, with projections to 2000

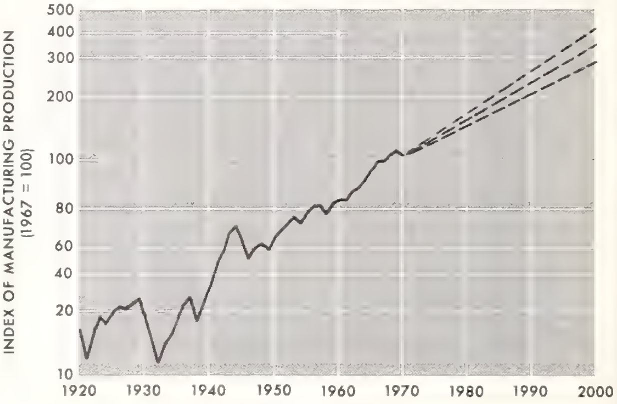

Figure 53

Index of manufacturing production in relation to gross national product, 1920 - 70

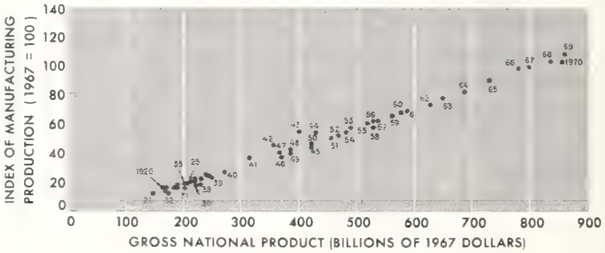

Figure 54

Technological and Institutional Assumptions

Institutional and technological changes in the U.S. economy have substantially influenced use of different raw materials. Some of these changes such as increasing urbanization, with resulting impacts on building heights and fire codes, for example, have led to partial displacement of timber products in construction. Technological developments in industries producing metals and plastics have also resulted in displacement of lumber and plywood in products such as furniture and containers.

On the other hand, new technology has simultaneously led to large increases in the use of lumber in pallets, greater use of plywood in construction, and use of pulp and paper, plywood, hardboard, and particleboard in a wide assortment of end uses.

In the following sections of this chapter, projections of demand for some products such as furniture have been adjusted for specific technological changes that appear to be in prospect. For other products, such as pulp and paper, use of historical data as a base for projections implicitly assumes a continuing stream of technological and institutional changes such as have occurred in the past, as well as other variables such as educational levels, capital availability, and military activities.

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[10] Federal Reserve Board. Federal Reserve Bulletin. Washington, D.C. Monthly. This index measures changes in the physical volume or quantity of output in manufacturing industries.

[11] See for example: Commoner, Barry. The closing circle. Alfred A. Knopf. 1971; Meadows, Donella H., Dennis L. Meadows, Jorgen Randus, and William W. Behrens. The limits of growth. Universe Books, New York. 1972.

Price Assumptions

Past increases in timber product prices have undoubtedly played an important role in determining levels of comsumption of timber products, both in actual terms and relative to competing materials. A number of closely related factors such as installation and maintenance costs, performance, useful life, and market promotion efforts have likewise affected actual and relative use.

To determine potential effects of alternative price levels, the medium projections of demand for major timber products were developed using three price assumptions, as follows:

(1) One set of projections was developed on the assumption that 1970 prices of timber products relative to average wholesale prices of all commodities and to most competing materials would not change significantly during the projection period. These were the price relationships prevailing during most of the 1950's and 1960's when most of the basic data on timber products use were compiled for this study. The 1970 prices were also intended as a base level for judging the size of price changes resulting from potential imbalances between timber demand and supply.

The 1970 price relationships could be expected to prevail only if supplies of stumpage meet demands at 1970 prices through the projection period—which later analyses indicate is not likely—and if productivity in the timber processing industries keeps pace with that in other industries.

In the past these conditions have not held for periods longer than a decade or two, and prices of most timber products have shown persistent longrun upward trends relative to the general price level (figs. 55, 56, and 57; Append. V, tables 2, 3, and 4). Timber product prices have also shown longrun upward trends relative to important competing raw materials such as iron, aluminum, and nonmetallic minerals.[12]

Relative wholesale price index of lumber 1800 - 1972, with projections to 2000

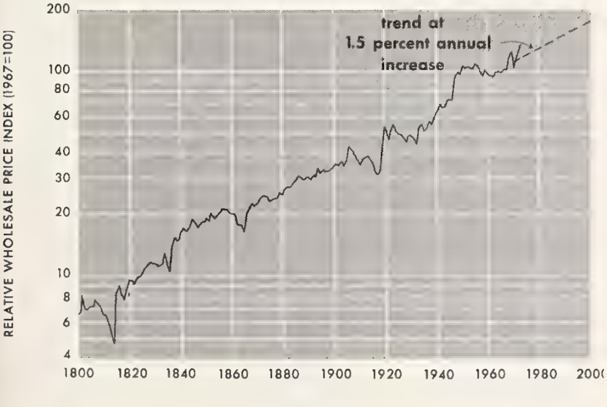

Figure 55

Relative wholesale price indexes of selected timber products 1940-72, and price assumptions 1970-2000

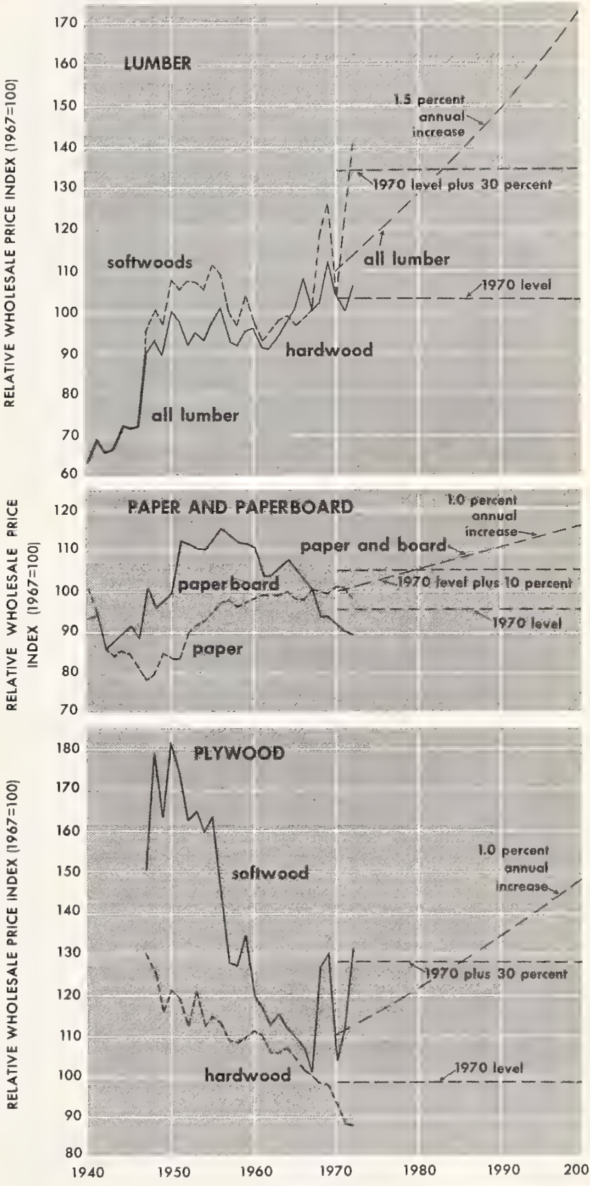

Figure 56

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[12] Potter, Neal, and Francis T. Christy, Jr. Trends in natural resource commodities—statistics of prices, output, consumption, foreign trade, and employment in the United States, 1870–1957. The Johns Hopkins Press, Baltimore. 1962.

Fisher, Joseph L., and Neal Potter. World prospects for national resources. The Johns Hopkins Press, Baltimore. 1964.

Stumpage prices for Douglas-fir and southern pine 1910 - 72, with projections to 2000

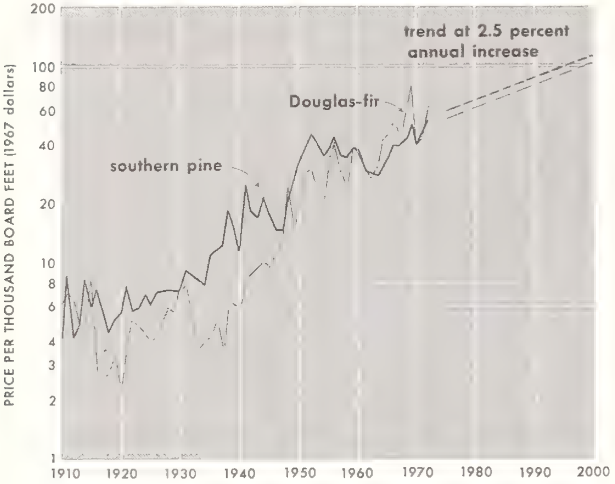

Figure 57

(2) In recognition of the likelihood of future price increases, a second set of demand projections was based on the assumption that through the projection period relative wholesale prices of lumber and plywood would be 30 percent, miscellaneous products and fuelwood 15 percent, and paper and board 10 percent above 1970 average prices.

The assumed level for lumber and plywood approximates the actual increases in relative softwood lumber and plywood prices between 1970 and 1972.

(3) A third set of projections was developed under the assumption that relative wholesale prices of timber products would rise from the 1970 trend level through the projection period much as in the past. For lumber the assumed average annual increase for these "rising" prices was 1.5 percent. For plywood, miscellaneous products, and fuelwood a 1.0 percent rise per year was assumed, and for paper and board 0.5 percent.

Since 1800 the relative wholesale price index for lumber increased at an average annual rate of 1.7 percent. There have been periods when this index showed little change, as in the period 1950–67 (fig. 55), but the longrun rising trend has been fairly steady.

Relative prices of pulp, paper, and board also leveled off in the 1952–70 period, but during the longer period from 1926 to 1970, price increases averaged about 0.5 percent annually. Relative prices of softwood and hardwood plywood declined sharply after 1950 in response to major improvements in technology in these rapidly growing industries but it was assumed for this projection, largely on the basis of prospective timber demand-supply balances, that future prices would rise as indicated above.

These three sets of price assumptions are summarized for the major timber products below:

Product and price assumptions	*Relative wholesale price indexes* 1970	1980	1990	2000
Lumber:				
(1) 1970 level	100	100	100	100
(2) 30 percent increase	100	130	130	130
(3) Rising prices	110	128	148	172
Plywood:				
(1) 1970 level	100	100	100	100
(2) 30 percent increase	100	130	130	130
(3) Rising prices	110	122	134	148
Paper and board:				
(1) 1970 level	100	100	100	100
(2) 10 percent increase	100	110	110	110
(3) Rising prices	105	110	116	122

Variables affecting prices of timber products.—Past increases in relative prices of timber products presumably have resulted from a combination of factors such as increasing competition for the available timber, and in some cases, rising costs of timber harvesting and manufacturing due to slower rates of technological progress than in other economic sectors.

Variation in price trends among timber products are attributed in part to different trends in productivity. The differences also reflect the relative importance of stumpage costs. In recent years, stumpage costs have made up roughly 35 to 45 percent of the f.o.b. mill prices of softwood lumber, for example, compared to 5 to 10 percent of the mill price of the lower grades of paper and board.

Stumpage price trends.—Stumpage prices have risen more rapidly in recent decades than prices of lumber and other processed timber products. For example, between 1910 and 1970 relative prices of Douglas-fir stumpage rose an average of 3.5 percent annually, while southern pine stumpage increased about 3.2 percent annually (fig. 57; Append. V, table 2).

The faster percentage increase in stumpage prices in comparison to product prices suggests that growing economic scarcity of timber has been of greater importance than increases in costs of harvesting and manufacturing in determining product prices. Also, in recent years closer utilization of timber for a combination of products such as lumber, plywood, and pulp chips, and better allocation of timber for highest value products, have tended to increase stumpage values, as well as increase recovery of timber per acre logged.

Regardless of the cause, the differential rates of growth in stumpage and product prices mean that much of the increase in product prices has been passed on to stumpage owners. Based in part on past trends in relationships between stumpage and product prices shown by a number of recent studies,[13] it has been assumed that an average of about 75 percent of future increases in timber product prices would go to stumpage. The remaining 25 percent of product price increases would be available to cover higher costs of harvesting and manufacture.

General approximations of the percentage increases in stumpage prices associated with the above assumptions, and the assumptions on product prices, are shown in the tabulation below:

Product and price assumptions	*Relative stumpage price indexes* 1970	1980	1990	2000	2010	2020
Sawtimber stumpage:						
(1) 1970 level	100	100	100	100	100	100
(2) 30 percent increase	100	161	161	161	161	161
(3) Rising prices	100	134	175	221	275	337
Pulpwood stumpage:						
(1) 1970 level	100	100	100	100	100	100
(2) 10 percent increase	100	318	318	318	318	318
(3) Rising prices	100	212	329	453	582	720

There would, of course, be widely varying rates of increase in stumpage prices for different species and kinds of timber. Where stumpage prices are low and account for only a small percentage of the price of processed timber products, rising product prices would result in very large percentage increases in stumpage prices.[14]

On the other hand, where stumpage prices comprise a substantial part of the price of the product, rates of growth in stumpage prices would be relatively low. For example, estimated increases in Douglas-fir and southern pine stumpage prices associated with the third price assumption average about 2.7 percent per year—somewhat below the average rate between 1910 and 1970.

The assumed relationships between product and stumpage prices also mean that stumpage in the future would account for an increasing proportion of product prices. For example, under the third price assumption, Douglas-fir and southern pine stumpage prices would rise to about 50 percent of the price of lumber by 2000—compared to roughly one-third in the 1965–70 period, and 10–15 percent in the early 1900's (fig. 58).

Stumpage prices as a percent of lumber prices

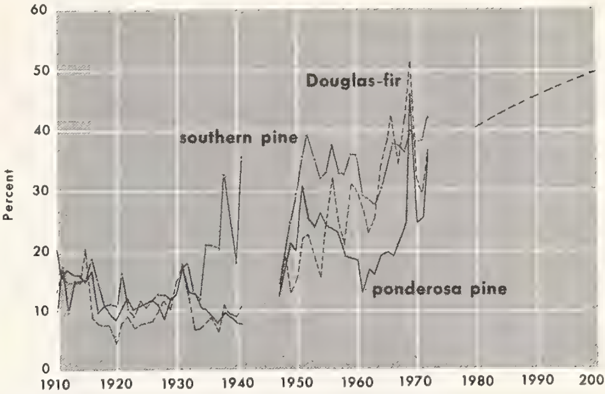

Figure 58

Pulpwood stumpage prices under the third price assumption specified earlier would rise from around 5–10 percent of the price of the lowest priced grades of paper and board in 1970 to over 20 percent by 2000.

Effects of Price Increases on Timber Demands

In preparing projections of demand for lumber and other timber products under these alternative price assumptions it has been necessary to make certain assumptions about the quantitative effects of price increases on projected demands.

General observation of timber markets indicates that in the shortrun price changes may have only limited effects on quantities of timber products that consumers will buy. For example, the spectacular rise of lumber and plywood prices in 1968–69, and a similar rise in 1971–72, appears to have had very limited initial impacts on consumption of these products in most end uses. Over the longer run, however, sustained upward shifts in prices of timber products relative to the wholesale price level and to competing products would undoubtedly lead to reduced demands for timber.

Longrun trends in lumber consumption and relative prices appear to illustrate this effect. Despite the very large expansion of major markets in construction, manufacturing, and shipping during the present century, lumber consumption in 1970 approximated the consumption level of the early 1900's. Presumably the increase in relative lumber prices—averaging 1.6 percent per year in this period—was an important factor leading to increased use of substitutes and other changes affecting lumber uses.

In contrast to lumber, the demand for paper seems to be rather insensitive to price changes. This is believed to reflect the lack of acceptable low-cost substitutes for paper and board in most end uses. Also, for many items such as books, tissue paper, and various kinds of containers the cost of paper or board to the final consumer is so small in relation to the total price of the product, or to consumer income, that even fairly large percentage changes in paper and board prices appear unlikely to have much impact on consumption.

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[13] Anderson, Walter C. Determinants of southern pine pulpwood prices. USDA Forest Serv. Res. Pap. SO–44, 10 p. 1969.

Guttenberg, Sam. Economics of southern pine pulpwood pricing. For. Prod. J. 20(4):15–18. 1970.

——— and Clyde A. Fasick. What decides southern pine stumpage prices? For. Ind. 92(13):45–47. 1965.

Holley, Daniel L., Jr. Factors in 1959–69 price rise in southern pine sawtimber analyzed. For. Ind. 97(4):40–41. 1970.

[14] This can be illustrated as follows: In 1970 the stumpage price of lodgepole pine sold from the National Forests averaged about $4 per thousand board feet while lodgepole pine 2×4's sold for about $70 per thousand board feet. Given the assumptions on rates of increase in the price of lumber (e.g., 1.5 percent per year) and the proportion passed on to stumpage, the projected price of lodgepole pine stumpage and 2×4's in 2000 would be $33 and $109 respectively. The annual rate of increase in stumpage prices would average 7.8 percent in the 1970's, with a fall to 3.3 percent in the 1990's.

Although such general relationships between timber product prices and demand seem reasonably clear, there are no valid quantitative measures of the longrun impacts of price increases on demand.[15] Estimates were therefore developed on a judgment basis to indicate the changes in demand expected to result from changes in product prices, as follows:

	Change in demand resulting from a sustained 1 percent rise in relative prices	
Years after price increase	*Lumber, plywood, and miscellaneous products (percent)*	*Paper and board (percent)*
1st	−0.1	−0.05
5th	−0.3	−0.1
10th	−0.5	−0.2

These assumptions mean, for example, that a 10 percent increase in lumber prices would result in a 1 percent decrease in demand in the first year after the price increase. At the end of the fifth year, if the price increase were sustained, demand would decrease 3 percent, with a further fall to 5 percent in the tenth year and thereafter. This sequence recognizes that it takes time to change to alternative materials and ways of producing products.

Actual changes in future consumption and in equilibrium prices of timber products and stumpage—in contrast to the selected price assumptions presented in this chapter—will be determined both by future trends in demands for timber products and by availability of timber supplies. Such comparisons of timber demands and supplies, and related price implications, are presented in the final chapter of this report.

DEMAND FOR TIMBER PRODUCTS IN NEW HOUSING

In 1970 roughly a third of the softwood lumber and plywood, plus substantial volumes of other timber products such as hardwood plywood, particleboard, and insulation board, were used in the production of new housing. Future demand for housing is also expected to be of great importance in determining demand for timber products.

This section begins with an analysis of the demand for housing by source of demand, that is, new households, vacancies, and replacements. Because of the large variation in the average use of lumber and other wood products per housing unit, trends in the types of units produced, that is, single-family, multifamily, and mobile units, have also been evaluated.[16] This is followed by an analysis of the use of various timber products per unit produced, and by projections of total demand for timber products in the housing sector.

Household Formation

New household formations have long constituted the major source of demand for housing. Although showing considerable fluctuation over the years, household formations have increased from an average of about 556 thousand annually in the 1920's to around 1 million in the 1960's (table 115).

Headship rates.—Household formations depend both on total growth in population and on the number of individuals willing and able to occupy separate dwelling units. The latter in turn is determined largely by the age structure of the population and level of income, and is expressed by headship rates, that is, the proportion of the population in each age group that heads separate households.

There is a well defined relationship between age and headship (table 116, fig. 59). Typically headship rates rise abruptly from the 15–19 year age class to the 25–29 year age class. Rates continue to rise slowly until after ages 70–75 when individuals reach the point where they can no longer maintain separate households.

Between 1940 and 1970, headship rates increased significantly in every age class. The sizable increase in headships among older and younger age persons who have traditionally lived with relatives

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[15] Several studies have examined demand-price relationships of timber products. Examples of recent studies of this kind include:

Gregory, G. Robinson. A statistical investigation of factors affecting the market for hardwood flooring. Forest Science 11(2): 200–203. 1965.

Holland, I. Irving. Some factors affecting the consumption of lumber in the United States with emphasis on demand. Ph.D. dissertation. Sch. For., Univ. Calif., Berkeley. 1955.

——— An explanation of changing lumber consumption and price. Forest Science 6(2):171–192. 1960.

McKillop, W. L. M. Supply and demand for forest products—an econometric study. Hilgardia 38(1). Univ. Calif., Berkeley. 1967.

Mead, Walter J. Competition and oligopsony in the Douglas-fir lumber industry. Univ. Calif., Berkeley and Los Angeles. 1966.

Mills, Thomas J. An econometric analysis of market factors determining supply and demand for softwood lumber. Ph.D. dissertation Dept. For., Mich. State Univ., Lansing. 1972.

Zivnuska, J. A. Supply, demand and the lumber market. J. Forest. 53:547–553. 1955.

[16] The material on demand for housing in this section has been based largely on a detailed study by Thomas E. Marcin (Projections of demand for housing by type of unit and region. U.S. Dept. Agri., Agri. Handb. 428, 76 p. 1972). Marcin's study also presents a computer model for estimating future demand for housing by type of unit and region.

TABLE 115.—*Households and household formations, by decade, 1920–70, with projections to 2000*

Year	Total households	Average annual household increase [1]		Persons per household
	Thousands	*Thousands*	*Percent*	*Number*
1920	24, 436	----------	----------	4. 3
1930	30, 002	556. 6	2. 1	4. 1
1940	34, 964	496. 2	1. 5	3. 8
1950	42, 969	800. 5	2. 1	3. 5
1960	53, 024	1, 005. 5	2. 1	3. 4
1970	63, 417	1, 039. 3	1. 8	3. 2
Low projections				
1980	76, 400	1, 330. 0	1. 9	3. 0
1990	88, 500	1, 210. 0	1. 5	2. 8
2000	97, 700	920. 0	1. 0	2. 7
Medium projections				
1980	76, 800	1, 370. 0	2. 0	3. 0
1990	89, 600	1, 280. 0	1. 6	2. 8
2000	99, 900	1, 030. 0	1. 1	2. 8
High projections				
1980	77, 200	1, 410. 0	2. 1	3. 0
1990	90, 400	1, 320. 0	1. 6	2. 9
2000	102, 700	1, 230. 0	1. 3	2. 9

[1] Average annual increase for decade ending on December 31 of preceding year for projections (see note below). Decade average for 1970–80 is calculated for 10-year period based on 9.75 years.

Note: Historical data on households are for decennial census dates, generally April 1. Projected number of households are estimates as of January 1 of given year.

Sources: U.S. Department of Commerce, Bureau of the Census. 1920–60—*United States census of housing, 1960.* HC(1)–1. 1963; 1970—*1970 Census of housing.* Ser. HC (V1)–1. 1971.

Projections: U.S. Department of Agriculture, Forest Service.

largely reflects a substantial increase in per capita disposable personal income and social changes in this period.[17]

Projections of headship rates, based on past relationships with per capita income and expectations about further social changes, show a continuing rise for all age classes through the projection period (table 116, fig. 60).

Headship rates by age class, 1950 and 1970, with projections for 2000

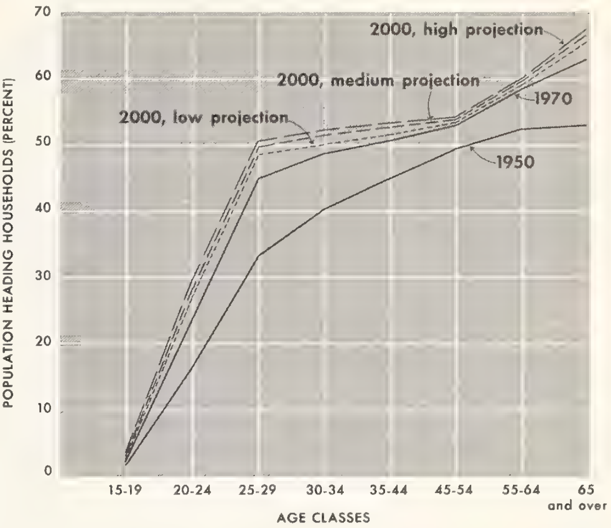

Figure 59

Projected household formations.—Projected household formations—based on the assumed headship rates and Census projections of population by age class—rise in the 1970's to a peak in the early 1980's, then decline through the rest of the 1980's and early 1990's. After that, projections depend increasingly on the population and economic assumptions adopted. Under the medium and high assumptions on population and economic growth, there would be a substantial rise in household formations after 1990.

The relatively limited differences between the high, medium, and low projections of household formations in the 1970's and 1980's largely reflect effects on headship rates of economic growth assumptions. After 1990, however, alternative projections diverge more and more as effects of different rates of population growth become increasingly important.

Numbers of persons per household, which are inversely related to headship rates, have declined from 4.3 in 1920 to about 3.2 in 1970. The projected headship rates indicate a further decline to 2.8 (medium level) in 2000 (table 115).

Household formations continue to be a major source of demand for housing through the projection period (table 117, fig. 61). However, they decline in importance, relative to replacements, falling from 59 percent of total projected demand in the 1960's to about 39 percent in the 1990-2000 decade.

Households by age class.—The distribution of households by age class is an important determinant of demand for the various types of

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[17] For a more complete discussion of the factors affecting changes in headship rates see Campbell, Burnham O. Population change and building cycles. Univ. Ill. Bull. 64(27):46–49. 1966.

Table 116.—*Headship rates by age class, 1940–70, with projections to 2000*

[Percent]

Year	Age class							
	15–19	20–24	25–29	30–34	35–44	45–54	55–64	65 and over
1940	0. 6	11. 3	28. 2	37. 7	44. 6	50. 7	54. 0	56. 8
1950	1. 2	16. 1	32. 9	39. 9	44. 8	49. 2	52. 2	52. 8
1960	1. 8	22. 1	39. 6	45. 0	48. 4	52. 6	56. 2	56. 1
1970	1. 8	23. 1	44. 6	48. 4	50. 4	52. 8	58. 3	62. 9
	Low projections							
1980	1. 9	24. 4	46. 2	49. 3	49. 3	50. 9	58. 5	64. 0
1990	2. 0	25. 7	47. 5	49. 6	51. 1	53. 2	58. 7	64. 9
2000	2. 1	26. 5	48. 2	49. 8	51. 3	53. 4	58. 9	65. 4
	Medium projections							
1980	2. 0	25. 0	46. 7	49. 8	51. 5	53. 1	59. 0	64. 5
1990	2. 2	26. 5	48. 2	50. 7	52. 2	53. 3	59. 3	65. 8
2000	2. 4	27. 6	49. 3	51. 2	52. 5	53. 5	59. 5	66. 7
	High projections							
1980	2. 1	25. 9	47. 1	50. 1	51. 7	53. 3	59. 2	64. 9
1990	2. 4	27. 9	49. 0	51. 2	52. 6	53. 6	59. 6	66. 3
2000	2. 7	29. 1	50. 2	51. 9	53. 1	53. 8	59. 8	67. 3

Note: Headship rate is the percentage of persons in each age class that heads a household.

Sources: 1940–50—Campbell, Burnham O. *Population change and building cycles.* Univ. Ill. Bull. 64(27): 46–49. 1966; 1960–2000—Marcin, Thomas C. *Projections of demand for housing by type of unit and region.* U.S. Dep. Agr., Agr. Handbk. 428, 76 p. 1972.

Headship in relation to per capita disposable personal income (in 1967 dollars) for population 18 years of age and older

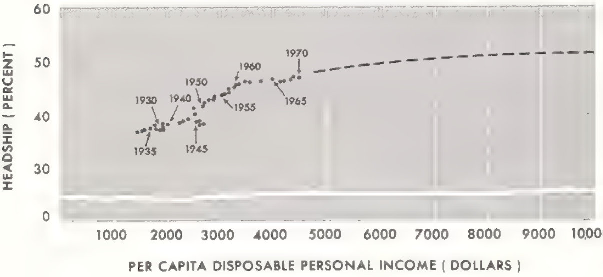

Figure 60

housing units, such as single-family and multifamily units.

Past fluctuations in the number of births result in fluctuations in projected numbers of households by age class and related changes in types of housing units demanded. As a result of the large number of births in the 1950's, for example, nearly 58 percent of the projected increase in households in the 1970's will have heads under 35 years old. Over four-fifths of these will be in ages 25–34. In contrast, the number of households with heads 35–44 years old will remain virtually unchanged. After 1990, on the other hand, most of the growth in the projected numbers of households will be in the older age classes.

Housing Replacements

A second major component of housing demand is the replacement of units lost from the housing inventory. During the 1960's replacements accounted for about 40 percent of the total number of housing units provided.

In the past four decades, gross replacements have increased from an average of about 100,000 units to nearly 700,000 (table 118). This rise

TABLE 117.—*Average annual demand for housing, by source of demand, 1920–70, with projections to 2000*

[Thousand units]

Period	Total demand	Household formations	Vacancies—conventional units	Net replacements			Mobiles not used as primary residences
				Total	Conventional units	Mobiles used as primary residences	
1920–29	803.4	556.6	239.0	7.8	----------	----------	----------
1930–39	365.1	496.2	−22.9	−108.2	----------	----------	----------
1940–49	809.0	800.5	80.7	−72.2	----------	----------	----------
1950–59	1,522.4	1,005.2	227.6	267.4	----------	----------	22.2
1960–69	1,648.7	1,039.3	−23.0	591.3	----------	----------	41.1
Low projections							
1970–79	2,400.0	1,330.0	170.0	800.0	650.0	150.0	100.0
1980–89	2,450.0	1,210.0	180.0	960.0	720.0	240.0	100.0
1990–99	2,290.0	920.0	160.0	1,120.0	830.0	290.0	90.0
Medium projections							
1970–79	2,500.0	1,370.0	200.0	820.0	660.0	160.0	110.0
1980–89	2,620.0	1,280.0	220.0	1,020.0	770.0	250.0	100.0
1990–99	2,560.0	1,030.0	220.0	1,210.0	920.0	290.0	100.0
High projections							
1970–79	2,580.0	1,410.0	220.0	840.0	680.0	160.0	110.0
1980–89	2,780.0	1,320.0	260.0	1,090.0	830.0	260.0	110.0
1990–99	2,930.0	1,230.0	280.0	1,310.0	990.0	320.0	110.0

Sources: Household formations: U.S. Department of Commerce, Bureau of the Census. 1920–60—United States census of housing, 1960. HC(1)–1. 1963; 1970—1970 Census of housing. Ser. HC(VI)–1. 1971.

Vacancies, conventional units—Forest Service estimates derived from data in the following sources: U.S. Department of Commerce, Bureau of the Census. *Historical statistics of the United States, colonial times to 1957.* 1960; 1970—Census of housing. Ser. HC(VI)–1. 1971.

Replacements—Forest Service estimates derived from data in the following sources: U.S. Department of Commerce, Bureau of the Census. *Historical statistics of the United States, colonial times to 1957.* 1960; *United States census of housing, 1960.* Vol. IV, Pt. 1–A. 1962.

Mobiles not used as primary residences—Forest Service estimates derived from data in U.S. Department of Commerce, Bureau of the Census. *United States census of housing, 1960.* Vol. IV, Pt. 1–A. 1962.

Projections: U.S. Department of Agriculture, Forest Service.

reflected such factors as shifts of population from farms and small towns to urban areas, which in turn required replacement of large numbers of abandoned dwellings. Urban renewal and highway construction programs have led to removal of many housing units. Dwellings have been lost through fire, flood, and other disasters. Some dwellings have been converted to other uses. Rising levels of income and public housing programs have also made possible an upgrading of the housing stock by replacing dilapidated units earlier than would have been possible otherwise.

In view of the growing numbers of older units in the Nation's housing stock, projected increases in per capita income, and a rising proportion of mobile homes with relatively short average life, it has been assumed that replacements will continue to rise during the projection period.

With the assumed replacement rates, demand for replacement units becomes the major item of projected housing production by the last decade of the century (table 117, fig. 61). By the 1990's projected net replacements average about 1.2 million units a year—almost twice the average of the 1960's, and about half of the projected total demand for housing in that decade.

About a quarter of the projected replacement demand in the next three decades is for mobile homes. This reflects in large part the comparatively short life of mobile homes. Little reliable data are available on this matter and estimates of probable life vary widely. In this analysis an

Demand for new housing by source of demand 1920-72 with projections (medium level) to 2000

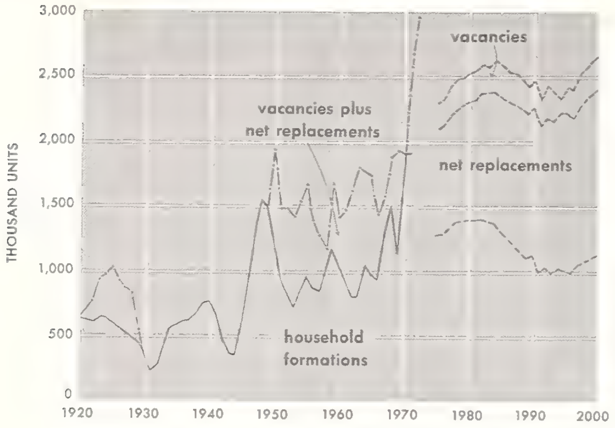

Figure 61

average life of about 12 years for mobile homes was assumed for the decade of the 1970's, increasing to about 20 years by 2000. This upward trend in average life in effect assumes a general upgrading in the quality of the units built.

Vacancies

The third major component of housing demand is vacancies. For the purposes of this report, vacancies have been divided into (1) units for sale or rent, (2) second homes and other units not for sale or rent, and (3) dilapidated units.

The first category includes units intended for year-round occupancy and on the market for sale or rent, and units sold or rented and awaiting occupancy. Vacancy rates for this category have shown a wide range (table 119). Because the 3.5 percent rate of 1970 was apparently below normal, an increase to 4.1 percent—about the average of the late 1960's—was assumed for the projection period.

The second category of vacancies includes units intended for seasonal occupancy, plus units held for occasional use, units temporarily occupied by persons who have a usual place of residence elsewhere, and units held for personal reasons of the owner. In recent years, such vacancies have composed between 3.5 and 5.8 percent of the housing inventory.

With the increased income, leisure time, and mobility that has been assumed, it was estimated that demand for seasonal units would rise, so that this vacancy rate would increase from 3.5 percent in 1970 to about 4.6 percent by 1980 (medium projection), with a subsequent rise to about 6.3 percent in 2000 (table 119). Demand for seasonal units is closely related to per capita disposable personal income and to numbers of people in the middle to older age classes. Hence, there are significant differences between projected high and low rates of second home demand, especially toward the end of the century.

TABLE 118.—*Housing unit replacements, 1920–70, with projections to 2000*

Period	Housing unit inventory [1]	Replacements [2]		
		Gross [1]	Net	
			Number [1]	Rate
	Thousands	*Thousands*	*Thousands*	*Percent*
1920–29	28, 614	115. 0	7. 8	(3)
1930–39	34, 958	105. 0	−108. 2	(3)
1940–49	41, 731	210. 0	−72. 2	(3)
1950–59	52, 302	453. 1	267. 4	0. 51
1960–69	63, 550	691. 3	591. 3	. 93
Low projections				
1970–79	75, 800	900. 0	800. 0	1. 06
1980–89	90, 200	1, 060. 0	960. 0	1. 07
1990–99	102, 600	1, 120. 0	1, 120. 0	1. 09
Medium projections				
1970–79	76, 200	920. 0	820. 0	1. 08
1980–89	91, 500	1, 120. 0	1, 020. 0	1. 11
1990–99	105, 200	1, 310. 0	1, 210. 0	1. 15
High projections				
1970–79	76, 400	940. 0	840. 0	1. 10
1980–89	92, 500	1, 190. 0	1, 090. 0	1. 18
1990–99	107, 900	1, 410. 0	1, 310. 0	1. 21

[1] Average annual number for the period.

[2] Gross replacement is the total number of units lost from the housing inventory. Net replacement is gross replacement less the number of units added by means other than new housing unit construction (that is, conversion of one unit to two or more units, conversion of nonresidential space to housing units, etc.).

[3] Less than 0.05 percent.

Sources: Housing unit inventory, 1920–30—Forest Service estimated average for the decade derived by adding estimated vacancies (table 119) to reported number of households (table 115).

Replacements, 1920–49—Forest Service estimates derived from demolition data published by U.S. Department of Commerce, Bureau of the Census. *Historical statistics of the United States, colonial times to 1957*. 1960; 1950–59—*United States census of housing, 1960*. Vol. IV, Pt. 1–A 1962; 1960–69—Forest Service estimates derived from housing start vacancy change and housing inventory data.

Projections: U.S. Department of Agriculture, Forest Service.

Projected total vacancy rates rise from the 1970 level of 7.6 percent to 10.4 percent in 2000

TABLE 119.—*Housing vacancies, 1920–70, with projections to 2000*

Year	Vacant units	Proportion of housing inventory			
		Total	For sale or rent [1]	Not for sale or rent [2]	Dilapidated
	Thousands	*Percent*	*Percent*	*Percent*	*Percent*
1920	200	0.8	NA	NA	NA
1930	2,590	7.9	NA	NA	NA
1940	2,361	6.3	4.1	2.2	--------
1950	3,168	6.9	1.6	4.2	1.1
1960	5,444	9.3	3.5	4.9	.9
1970	5,214	7.6	3.5	3.5	.5
Low projections					
1980	6,900	8.3	4.0	4.3	--------
1990	8,700	9.0	4.1	4.9	--------
2000	10,300	9.5	4.1	5.4	--------
Medium projections					
1980	7,200	8.6	4.0	4.6	--------
1990	9,400	9.5	4.1	5.4	--------
2000	11,600	10.4	4.1	6.3	--------
High projections					
1980	7,400	8.7	4.0	4.7	--------
1990	10,000	10.0	4.1	5.9	--------
2000	12,800	11.1	4.1	7.0	--------

[1] Data for 1960, 1970, and projections include units available for sale or rent and units sold or rented awaiting occupancy. For 1940 and 1950 units sold or rented awaiting occupancy not included. For 1940 includes dilapidated units.

[2] Data for 1960, 1970, and projections include seasonal units, units held for occasional use, temporarily occupied units, and units held for personal reasons of the owner. For 1940 and 1950 also includes units sold or awaiting occupancy.

Note: Does not include vacant mobile homes.

Sources: Forest Service estimates derived from data in the following sources: U.S. Department of Commerce, Bureau of the Census. *Historical statistics of the United States, colonial times to 1957.* 1960; *1970 census of housing.* Ser. HC(V1)-1, 1971.

Projections: U.S. Department of Agriculture, Forest Service.

(medium level). The associated demand for new housing unit production is estimated at 200 thousand units annually in the 1970's (medium level), rising to 220 thousand units in the 1980's and 1990's (table 117, fig. 61).

These vacancy rates, and associated housing demand, do not include vacant mobile homes. The estimates of mobile home demand (table 120), however, do include allowances for mobile home vacancies, as well as for mobile home units used for nonhousing purposes.

Total Demand for New Housing

The total number of housing units produced in the United States during the 1960's averaged 1.65 million units per year (table 120). This was slightly above the average for the 1950's and about double the numbers produced in the 1920's and 1940's.

Production of housing units jumped to 2.4 million units in 1971, and to 2.9 million units in 1972—materially above the trend level projected in this study for the early 1970's. However, housing has been highly cyclical (fig. 61), and production in peak years can be expected to substantially exceed trend values.

The trend level projections shown in this study and similar projections prepared by the National Association of Homebuilders,[18] show a sharply rising trend in housing demand in the 1970's. By the early 1980's the medium projection of this study reaches more than 2.7 million units annually (fig. 62). Starting in the late 1980's there is some decline in projected housing demand—

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[18] National Association of Home Builders. Housing requirements for the '70's. Econ. News Notes 18(7). Washington. July 1972.

TABLE 120.—*Average annual production of new housing units, by type of unit, 1920–72, with projections to 2000*

[Thousand units]

Period	Total demand	Conventional units			Mobiles		
		Total	One- and two-family	Multi-family	Total	Used as primary residences	Not used as primary residences
1920–29	803.4	803.4	636.2	167.2	--	--	--
1930–39	365.1	365.1	319.7	45.4	--	--	--
1940–49	809.0	780.5	711.2	69.3	28.5	--	--
1950–59	1,522.4	1,460.1	1,318.0	142.1	62.6	40.4	22.2
1960–69	1,648.7	1,443.2	981.9	461.3	205.5	164.4	41.1
1970	1,870.2	1,469.0	863.1	605.8	401.2	--	--
1971	2,581.1	2,084.5	1,216.5	868.1	496.6	--	--
1972	2,954.4	2,378.5	1,383.0	995.4	575.9	--	--
Low projections							
1970–79	2,400.0	1,880.0	1,110.0	770.0	520.0	420.0	100.0
1980–89	2,450.0	1,960.0	1,330.0	630.0	490.0	390.0	100.0
1990–99	2,290.0	1,850.0	1,350.0	500.0	440.0	350.0	90.0
Medium projections							
1970–79	2,500.0	1,970.0	1,160.0	810.0	530.0	420.0	110.0
1980–89	2,620.0	2,100.0	1,410.0	690.0	520.0	420.0	100.0
1990–99	2,560.0	2,070.0	1,460.0	610.0	490.0	400.0	90.0
High projections							
1970–79	2,580.0	2,040.0	1,190.0	850.0	540.0	430.0	110.0
1980–89	2,780.0	2,230.0	1,490.0	740.0	550.0	440.0	110.0
1990–99	2,930.0	2,370.0	1,590.0	780.0	560.0	450.0	110.0

Sources: Housing starts, 1929–49 and 1960–62—Forest Service estimates derived from data in the following sources: U.S. Department of Commerce, Bureau of the Census: *Housing construction statistics, 1889 to 1964.* 1966; *1950 census of housing.* Vol. I, Pt. 2, 1953; U.S. Department of Labor, Bureau of Labor Statistics. *Nonfarm housing starts, 1889–1958.* Bull. 1260, 1959; U.S. Department of Commerce, Bureau of the Census. 1950–59—*United States census of housing, 1960.* Vol. IV, Pt. 1–A, 1962; 1963–69—*Housing starts.* Cons. Rep. Ser. C20–71–6, 1971; 1970–72—*Housing starts.* Cons. Rep. Ser. C20–73–3, 1973.

Total mobile homes, 1940–49—Forest Service estimates derived from data in U.S. Department of Commerce, Bureau of the Census. *1950 census of housing.* Vol. I, Pt. 1, 1953; 1950–59—Forest Service estimates derived from data in U.S. Department of Commerce, Business and Defense Services Administration. *Construction Review.* 7(3), 1961; *Construction Review.* 12(8), 1966; Mobile Home/Recreational Dealer Magazine. *Market Study, 1967–1968,* 1969; 1960–63—U.S. Department of Commerce, Business and Defense Services Administration. *Construction Review;* 1964–1969—Bureau of the Census. *Housing starts.* Cons. Rep. Ser. C20–71–6, 1971; 1970–72—*Housing starts.* Cons. Rep. Ser. C20–73–3. 1973.

Mobiles used as primary residences, Forest Service estimates derived from data published by U.S. Department of Commerce, Bureau of the Census. *United States census of housing, 1960.* Vol. IV, Pt. 1–A. 1962.

Projections: U.S. Department of Agriculture, Forest Service.

a reflection of the decline in birth rates in the 1960's. By 2000, however, projected housing demand rises again to about 2.8 million units. The high and low projections follow similar trends.

The projections of housing demand in the 1970's used in this study are somewhat below National housing goals.[19] Differences between these goals and the high projection of this study, for example, amount to 0.8 million units over the 1973–78 period.

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[19] U.S. Congress, House Committee on Housing and Currency. 2nd Annual report on national housing goals. U.S. Cong., 91st, 2nd sess., Hous. Doc. 91–292. 1970.

New housing unit production by type of unit, 1920-72, with projections (medium level) to 2000

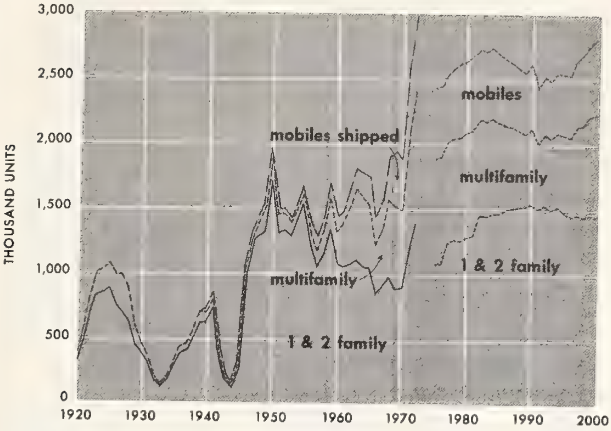

Figure 62

Demand for New Housing by Type of Unit

Because of large differences in quantities of timber products used per unit, type of housing units demanded is of major importance in projecting demands for timber products.

In the 1920–72 period 1- and 2-family units were the dominant types of new units produced (table 120, fig. 62). There has, however, been a substantial amount of variation in the relative importance of these units. During the 1920's, proportions of 1- and 2-family units reached a low of about 73 percent of all new units produced. By the mid-1950's such units accounted for over 90 percent of all new units. In the late 1950's the trend changed again and by 1972 1- and 2-family units accounted for only 47 percent of total housing production.

From the 1920's through most of the 1950's multifamily units accounted for the remaining housing output but by the late 1950's the mobile home had emerged as a significant source of new housing. In 1972 mobiles composed over 19 percent of total new housing production.

Single-family housing units have typically been occupied by middle age classes, a response to family size and income. Occupancy of multifamily units and mobile homes, on the other hand, has been highest among the younger age classes, which typically have small families and relatively lower incomes and among older age classes.

In this study, occupancy rates by age class and type of unit prevailing in the late 1960's were assumed to continue through the projection period. Prospective shifts in age distribution of the population indicated earlier in this section result in substantial changes in projected demands for the various types of units (table 120, fig. 62).

Projected demand for 1- and 2-family units continues to increase in the 1970–2000 period and constitutes the major element of housing demand. Projected demand for multifamily units is relatively high in the 1970's, because of the large number of young households, but drops in the 1980's and early 1990's.

Projected demand for mobile units used as primary residences remains relatively constant during the projection period. Additional production of mobile homes is expected for part-time use as vacation homes, offices, and other nondwelling purposes. An estimated 20 percent of all mobile units produced in 1970 was used in this way and this percentage is assumed to continue. Projected total demand for mobile homes thus averages about 500,000 units a year (medium level).

Conversions

Conversions of existing housing units into two or more units, and conversion of nonresidential structures to housing units, has at times met a substantial part of the Nation's housing demands. In the 1930's, for example, more than one-third of all units provided came from such conversions. Projected housing replacement demands include an allowance of 100,000 net conversions per year—about the same number as in the late 1960's (table 118).

Timber Products Use Per Dwelling Unit

Since the beginning of the 1960's there have been significant changes in average unit use of timber products in housing (table 121). Use of plywood and building boards, per unit, has risen substantially, while use of lumber has declined. These trends reflect factors such as changes in unit size, structural and architectural characteristics, and materials substitution.

Trends in unit size.—In the 1960's there was a fairly steady increase in size of single-family units constructed, with the average rising from 1,340 square feet in 1962 to 1,500 square feet in 1970.[20] This growth in size of units contributed to the rise in use of plywood per single-family unit and partially offset a downward trend in lumber use per square foot of floor area.

There also has been an increase in the average size of multifamily units. In 1965—the first year such data became available—5 percent of the new units in privately owned apartment buildings had three or more bedrooms, 44 percent had two bedrooms, and the remainder were one bedroom or efficiency units. By 1970, units with three or more

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[20] U.S. Department of Commerce, Bureau of the Census. Characteristics of new one-family homes: 1970. C25–70–13. 1971.

TABLE 121.—*Timber products consumed per housing unit, by type of unit, 1962 and 1970, with projections (1970 relative prices) to 2000* [1]

Year	Lumber			Plywood (⅜-inch basis)			Building board [2] (½-inch basis)		
	One- and two-family	Multi-family	Mobile homes	One- and two-family	Multi-family	Mobile homes	One- and two-family	Multi-family	Mobile homes
	Board feet	*Board feet*	*Board feet*	*Square feet*	*Square feet*	*Square feet*	*Square feet*	*Square feet*	*Square feet*
1962	11, 190	4, 500	1, 510	3, 010	1, 800	1, 840	----------	----------	----------
1970	10, 840	3, 700	1, 680	5, 385	1, 910	1, 300	1, 570	125	1, 590
Projections									
1980	10, 660	3, 400	1, 795	6, 140	1, 950	1, 510	1, 860	140	1, 625
1990	10, 500	3, 100	1, 895	6, 470	1, 975	1, 620	2, 100	155	1, 680
2000	10, 260	2, 900	2, 000	6, 670	1, 985	1, 720	2, 310	170	1, 775

[1] Includes both hardwoods and softwoods. Includes allowance for on-site and manufacturing waste.

[2] Hardboard, insulation board, and particleboard. See Append V, table 5, for projections of demand for these products.

bedrooms had increased to 11 percent and two bedroom units to 47 percent of the total.[21]

Mobile homes have shown the largest increase in average size. In 1962, only a fourth of the mobile homes produced were more than 10 feet wide, compared to over 90 percent in 1968. By 1970 an estimated 8 percent of the mobile homes produced were 14 feet wide and nearly 10 percent were double-wide sectional units. The double-wides are not only relatively large units but many utilize heavier framing members and pitched roofs. Lengths of mobile homes also increased substantially from typical lengths of 29 to 45 feet in the early 1960's to units as long as 70 feet.

For the future it was assumed that the rise in family incomes and preferences of home buyers will lead to further growth in average size of all types of housing units produced.

Structural and architectural characteristics.—Along with growth in average size of units, the percentage of new single-family houses built with garages grew from 50 to 65 percent between 1950 and 1969.[22] Given the growing affluence assumed in this study, the trend to more and larger garages appears likely to continue.

Other changes have led to the virtual disappearance of porches that were once a feature of nearly all one-family houses. Recently, however, many houses have been built with wooden decks which serve many of the purposes of the earlier porches.

Average unit use of timber products, especially lumber, has been reduced with the rapid growth in proportions of housing units built with concrete slab foundations. Between 1956 and 1970, the proportion of single-family units constructed in this way rose from 16 percent to 36 percent.[23] Construction of houses on slab foundations seems likely to continue to grow, although at a slower rate than in the past, in response to continued population shifts to the South and Southwestern sections of the Nation where slab construction is used in a large proportion of single-family houses.

A new construction innovation that may offset losses in timber products due to increased slab construction is the all-weather wood foundation system which uses substantial amounts of lumber and plywood instead of concrete or block construction.

Another change that has significantly reduced timber products use per unit has been the increased importance of two-story houses. In 1956 less than 10 percent of the new, one-family houses had two stories, in contrast to 17 percent a decade and a half later.[24] This type of construction reduces substantially the roof area and roofing materials required to cover a given floor area. Two-story construction permits enlarging house size without increasing the size of the building lot, a factor that should become increasingly important in the future with rising land values.

Rising land values have apparently also been an important factor in the rapid growth in construction of townhouses or row houses in recent years. Most of these units have common masonry side walls with consequent savings in the materials used for framing, sheathing and exterior walls. It was assumed in this analysis that proportions of townhouses will continue to increase.

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[21] U.S. Department of Commerce, Bureau of the Census. Housing starts. C20–71–5. 1971.

[22] Characteristics of new one-family houses: 1970. op. cit.; U.S. Department of Labor, Bureau of Labor Statistics. New housing and its materials, 1940–56. Bull. 1231. 1968.

[23] Ibid.

[24] Ibid.

Prefabrication of structural members such as roof trusses and increased factory fabrication of housing components and units have tended to lower average unit use of some wood products, primarily through reduction of waste and improved design. This trend toward use of prefabricated housing components and some increase in factory fabrication is expected to continue through the projection period, although problems of building codes, consumer tastes, transportation costs, and fragmentation of the building industry may act as constraints on a major shift to industrialized housing.

In conventional on-site construction, more efficient use of wood, such as wider spacing of studs and other structural members, has tended to bring about somewhat lower use of timber products per unit. There are also opportunities for additional savings in use of materials by changes in design and specifications.

Materials substitution.—The rising trends in use of plywood and building board per housing unit and the concomitant drop in lumber use has reflected extensive substitution of plywood and building board for lumber in such uses as sheathing and subflooring. For example, between 1959 and 1968, average lumber use for sheathing and subflooring in single-family houses inspected by FHA declined from 1,667 board feet per unit to 975 board feet.[25]

Plywood use for these components in this period rose from an average of 1,314 square feet to 3,086 square feet (⅜-inch basis).

In addition to such wood-for-wood substitution, wood products have been displaced in a number of applications by metal siding, by plastic trim, and by nonwood flooring materials. Substitution of carpeting for oak flooring has had a particularly marked effect on wood use in apartment construction.

Metal framing systems—steel and aluminum—have been used in single-family house construction as well as in multifamily structures. Although use of such systems in single-family construction has been quite limited, one recent study concluded that substantial displacement could occur with a 30 to 50 percent increase in relative prices of lumber over the 1970 level.[26] Another study indicated that with 1972 prices of materials and labor, that is, with relative lumber prices 35 percent above 1970, lumber retained a slight cost advantage over steel for exterior studs and for floor framing for most builders, but had a substantial disadvantage for interior studs.[27]

Projected timber products use factors.—The projections of lumber and other timber products used per housing unit shown in table 121 have been based upon a judgment evaluation of the various factors discussed above.

For the initial projection, with 1970 relative prices of timber products, it was assumed that total use of timber products per square foot of floor area in 1- and 2-family housing, would decline slightly, as shown by the following tabulation:

Year	*Floor area (square feet)*	*Lumber (board feet)*	*Plywood (square feet, ⅜-inch basis)*	*Building board (square feet, ½-inch basis)*	*All timber products (board feet equivalent)*
1962	1,335	8.38	2.25	0.99	11.30
1970	1,475	7.35	3.65	1.06	11.54
			Projections		
1980	1,615	6.60	3.80	1.15	11.01
1990	1,680	6.25	3.85	1.25	10.80
2000	1,710	6.00	3.90	1.35	10.69

Projected lumber use continues to drop while use of plywood and panel products is expected to rise. The projections assume substantial increases in the per unit use of building board in all types of units. Use of particleboard is expected to rise fairly rapidly, with moderate increases in use of hardboard, and a decline in use of insulation board per unit. There may be a much larger rise in the use of particleboard if structural grades are developed which can be substituted for plywood in roof sheathing and subflooring.

Projected Demand for Timber Products in New Housing

Total consumption of lumber in new residential construction amounted to an estimated 12.3 billion board feet in 1970 (table 122). This was somewhat below the average for the 1962–70 period and much below consumption of 19.5 billion board feet in 1972.

The medium projection of lumber demand—derived from the medium projection of demand for housing, the wood use factors shown in table 121, and 1970 price relationships—rises substantially during the 1970's and early 1980's to more than 18 billion board feet by 1990 (table 122).

Demand for plywood and building board roughly doubles in the projection period to about 12 billion square feet of plywood and 4.4 billion square feet of building board.

Under the higher price assumptions specified earlier, projected demand for timber products

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[25] Phelps, Robert B. Wood products used in single-family houses inspected by the Federal Housing Administration, 1959, 1962, and 1968. USDA Stat. Bull. 452, 29 p. 1970.

[26] Kroll, Seymour and Associates, Inc. A comparative research study of wood and metal framing systems. Western Wood Products Association Report WWP–1, Copy 1. Portland, Oregon. 1971.

[27] Koeningshof, Gerald A. Comparative in-place cost between wood and steel residential floor and wall framing. Unpublished. U.S. Forest Serv. Washington. Dec. 1972.

TABLE 122.—*Timber products consumed in new housing, 1962 and 1970, with projections of demand (1970 relative prices) to 2000* [1]

Year	Lumber	Plywood (⅜-inch basis)	Building board [2] (½-inch basis)
	Million board feet	*Million square feet*	*Million square feet*
1962	13, 940	4, 180	1, 660
1970	12, 270	6, 330	2, 070
Low projections			
1980	16, 160	9, 560	3, 170
1990	17, 310	10, 900	3, 800
2000	16, 000	10, 680	3, 980
Medium projections			
1980	17, 180	10, 150	3, 360
1990	18, 650	11, 750	4, 080
2000	17, 950	11, 990	4, 440
High projections			
1980	18, 240	10, 770	3, 550
1990	20, 000	12, 600	4, 370
2000	20, 770	13, 910	5, 130

[1] Includes both hardwoods and softwoods. Includes allowance for on-site and manufacturing waste.

[2] Hardboard, insulation board, and particleboard.

in new housing would be significantly lower than the estimates shown in table 122. The summary section of this chapter includes estimates of the effect of alternative price assumptions on total demand for lumber, plywood, and building board in all uses.

DEMAND FOR TIMBER PRODUCTS IN RESIDENTIAL UPKEEP AND IMPROVEMENTS

In addition to the timber products used in construction of new residential units, substantial volumes are used annually for the upkeep and improvement of units in the existing housing inventory.

Expenditures for Residential Upkeep and Improvements

In the period 1960–72, the years for which the most reliable data are available, expenditures for upkeep and improvements generally fluctuated between $12 and $13 billion annually (1967 dollars). For the purposes of this study it was assumed that in the projection period expenditures would grow at about the same rate as the housing inventory. Under this assumption, projected annual expenditures rise to about $19.3 billion (medium level) by 2000 (table 123). This involves a slight increase in annual expenditures per household.

TABLE 123.—*Expenditures and timber products use per thousand dollars of expenditure, residential upkeep and improvements, 1970, with projections (1970 relative prices) to 2000*

Year	Total expenditures	Use per thousand dollars of expenditures		
		Lumber	Plywood (⅜-inch basis)	Building board [1] (½-inch basis)
	Millions of 1967 dollars	*Board feet*	*Square feet*	*Square feet*
1970	12, 067	390	210	90
Low projections				
1980	14, 300	350	215	95
1990	16, 740	330	220	105
2000	18, 640	320	225	110
Medium projections				
1980	14, 470	350	215	95
1990	17, 110	330	220	105
2000	19, 320	320	225	110
High projections				
1980	14, 610	350	215	95
1990	17, 390	330	220	105
2000	20, 040	320	225	110

[1] Includes hardboard, insulation board, and particleboard.

Sources: Expenditures: U.S. Department of Commerce, Bureau of the Census. *Residential alterations and repairs.* C50–67A, Pt. 1, 1968, and C50–70A, 1971. Timber products use: U.S. Department of Agriculture, Forest Service.

Projections: U.S. Department of Agriculture, Forest Service.

Timber Products Use and Projected Demand

Lumber consumption per thousand dollars of expenditure for upkeep and improvements of residential structures, based upon surveys in sample cities, was estimated at about 390 board feet in 1970 (table 123). It was assumed that future lumber use per dollar would decline at about the same rate as per unit use in new 1- and 2-family construction.

With the assumed increases in expenditures, total lumber demand rises from 4.7 billion board feet in 1970 to about 5.1 billion board feet by 1980

TABLE 124.—*Timber products consumed in residential upkeep and improvements, 1970, with projections of demand (1970 relative prices) to 2000* [1]

Year	Lumber			Plywood (⅜-inch basis)			Building board [2] (½-inch basis)		
	Million board feet			*Million square feet*			*Million square feet*		
1970	4, 690			2, 510			1, 060		
	Projections								
Year	Low	Medium	High	Low	Medium	High	Low	Medium	High
1980	5, 000	5, 060	5, 110	3, 060	3, 100	3, 130	1, 360	1, 370	1, 390
1990	5, 560	5, 680	5, 770	3, 720	3, 800	3, 860	1, 720	1, 760	1, 790
2000	5, 930	6, 140	6, 370	4, 190	4, 350	4, 510	2, 070	2, 140	2, 220

[1] Includes both hardwoods and softwoods. Includes allowance for on-site and manufacturing waste.

[2] Hardboard, insulation board, and particleboard.

(medium projection at 1970 relative prices), with a further increase to 6.1 billion board feet by 2000 (table 124).

Plywood use per thousand dollars of expenditures in 1970 was estimated to be about 210 square feet. It was assumed that this average would rise slowly to about 225 square feet in 2000, with the associated total demand (medium projection) over 4.3 billion square feet—about 70 percent above the level of use in 1970.

Building board use averaged about 90 square feet per thousand dollars of expenditures in 1970 and is assumed to increase to about 110 square feet by 2000. Given this average use and projected expenditures, projected demand for building board in 2000 is 2.1 billion square feet—nearly double the level of use in 1970.

DEMAND FOR TIMBER PRODUCTS IN NEW NONRESIDENTIAL CONSTRUCTION

Nearly 10 percent of the lumber and plywood used in the United States in 1970—plus substantial volumes of building board—was consumed in a wide variety of nonresidential buildings and structures.

In this study, nonresidential construction was divided into five classes: (1) private commercial buildings (offices, stores, warehouses, etc.); (2) other buildings (public and private nonhousekeeping, industrial, educational, religious, hospital and institutional buildings); (3) utility, water, and sewer systems; (4) highways; and (5) all other (military facilities, conservation and development projects, railroad construction except track construction, and construction not included in other categories).

Nonresidential Construction Expenditures

Expenditures in these classes of construction in recent decades have fluctuated rather widely in response to changing economic conditions (table 125, fig. 63). The longrun trend has been strongly upward, however, with expenditures in most classes rising between three and five times in the 50 years 1920 to 1970. Expenditures for highway construction have shown even larger increases, a reflection of the Federal-Aid Highway Act of 1956 which authorized the interstate highway system.

Per capita expenditures also increased in the 1920–70 period, roughly doubling for most classes of nonresidential construction (Append. V, table 6).

Although growth rates for some classes are dropping, substantial increases are projected for each class of construction, ranging from around 2 times for highways to around 3 times for commercial buildings. Per capita expenditures almost double (medium projection) for all classes combined (Append. V, table 6). Total projected expenditures for new nonresidential construction rise from $49 billion (1967 dollars) in 1970 to $145 billion in 2000 (medium projection).

Timber Products Use in Nonresidential Construction

There have been divergent trends in the use of different timber products in nonresidential construction in recent years (table 126, fig. 64; Append. V, tables 7–9). Between 1962 and 1970, for example, estimated consumption of lumber dropped from 3.0 to 2.6 billion board feet. Plywood use, on the other hand, rose from 1.3 to 1.7 billion square feet (⅜-inch basis) and building board increased from 0.4 to 0.7 billion square feet (½-inch basis).

In the post World War II years total expenditures for nonresidential construction rose an average of 5.0 percent annually. During this period there were close statistical relationships between changes in expenditures for most classes of construction and changes in gross national product (fig. 63).

TABLE 125.—*Expenditures for new nonresidential construction* [1] *by construction class 1920–70, with projections to 2000*

Year	All classes		Buildings				Utilities, water and sewer systems [4]		Highways		All other [5]	
			Commercial [2]		Other [3]							
	Expenditures	Annual rate of change	Expenditures	Annual rate of change	Expenditures	Annual rate of change	Expenditures	Annual rate of change	Expenditures	Annual rate of change	Expenditures	Annual rate of change
	Billions of 1967 dollars	*Percent*	*Billions of 1967 dollars*	*Percent*	*Billions of 1967 dollars*	*Percent*	*Billions of 1967 dollars*	*Percent*	*Billions of 1967 dollars*	*Percent*	*Billions of 1967 dollars*	*Percent*
1920	11.6	----------	2.0	----------	5.1	----------	2.2	----------	0.9	----------	1.4	----------
1925	20.2	11.7	3.7	12.8	8.0	9.5	4.3	14.0	1.9	16.5	2.3	10.8
1930	23.5	3.1	3.4	−1.6	8.5	1.3	4.9	2.8	3.5	12.0	3.2	6.9
1935	11.6	−13.1	1.1	−20.8	3.2	−17.6	1.6	−20.1	2.0	−10.7	3.7	3.4
1940	17.9	8.9	1.5	6.4	5.4	10.7	3.1	14.3	3.3	10.7	4.6	4.1
1945	11.4	−8.6	.6	−15.1	5.1	−1.2	2.0	−9.1	.7	−26.2	3.0	−7.9
1950	24.0	16.0	2.5	31.6	8.9	11.9	6.2	26.1	3.2	34.8	3.2	.9
1955	33.4	6.9	4.8	13.4	13.0	7.9	6.4	.8	5.1	10.1	4.1	5.1
1960	38.0	2.6	5.2	1.7	14.1	1.9	6.9	1.3	6.7	5.6	5.0	3.7
1965	49.2	5.3	6.7	5.4	20.3	7.3	8.5	4.4	8.4	4.3	5.3	1.7
1966	51.9	5.6	6.6	−1.9	22.1	9.1	9.1	7.2	8.7	4.2	5.4	1.6
1967	51.3	−1.0	6.4	−2.6	21.3	−3.6	9.6	4.9	8.6	−1.3	5.4	.4
1968	52.7	2.7	7.3	13.8	20.0	−6.0	11.1	15.2	8.9	3.7	5.4	.4
1969	52.2	−1.1	8.1	10.8	20.2	.8	10.5	−5.4	8.2	−7.8	5.2	−4.3
1970	49.5	−5.1	7.7	−4.7	18.0	10.6	11.1	5.6	7.9	−4.1	4.8	−7.0
Low projections												
1980	73.9	[6] 3.0	11.4	[6] 3.2	30.1	[6] 3.2	14.0	[6] 3.4	11.4	[6] 2.4	7.0	[6] 2.3
1990	98.2	2.9	15.4	3.1	40.5	3.0	19.7	3.5	13.9	2.0	8.7	2.2
2000	129.4	2.8	20.8	3.0	53.4	2.8	28.1	3.6	16.3	1.6	10.8	2.1
Medium projections												
1980	76.8	[6] 3.4	11.8	[6] 3.6	31.3	[6] 3.6	14.5	[6] 3.8	11.9	[6] 2.8	7.3	[6] 2.7
1990	106.2	3.3	16.7	3.5	43.8	3.4	21.3	3.9	15.0	2.4	9.4	2.6
2000	145.2	3.2	23.3	3.4	60.0	3.2	31.5	4.0	18.3	2.0	12.1	2.5
High projection												
1980	79.9	[6] 3.8	12.3	[6] 4.0	32.6	[6] 4.0	15.1	[6] 4.2	12.3	[6] 3.2	7.6	[6] 3.1
1990	114.8	3.7	18.0	3.9	47.3	3.8	23.0	4.3	16.3	2.8	10.2	3.0
2000	163.1	3.6	26.2	3.8	67.3	3.6	35.4	4.4	20.6	2.4	13.6	2.9

[1] Excludes farm construction.

[2] Includes private commercial buildings such as offices, stores, warehouses, and restaurants.

[3] Includes public and private nonhousekeeping, industrial, educational, religious, hospital and institutional, and similar miscellaneous buildings.

[4] Includes telephone and telegraph, other public utilities, sewer systems, and water supply facilities.

[5] Includes military facilities, conservation and development, railroad construction except track construction, and all other public and private construction not included in other categories.

[6] Rates of increase calculated from the following 1970 trend values: All classes, $54.9 billion; commercial buildings, $8.3 billion; noncommercial buildings, $22.0 billion; utilities, water and sewer systems, $10.0 billion; highways, $9.0 billion; and all other, $5.6 billion.

Note: Construction expenditures converted to 1967 dollars by U.S. Department of Agriculture, Forest Service. Annual rates of increase are calculated for 5-year periods from 1920 through 1965, for 1-year periods 1965 through 1970, and for 10-year periods through 2000.

Sources: Construction expenditures, U.S. Department of Commerce. 1920–61—A *supplement to construction review, construction statistics 1915–1964*. Business and Defense Services Administration, 1966; 1962—70—*Value of new construction put in place 1958–1970*. Bureau of the Census, Constr. Rept. C–30–70S, 1971.

Projections—U.S. Department of Agriculture, Forest Service.

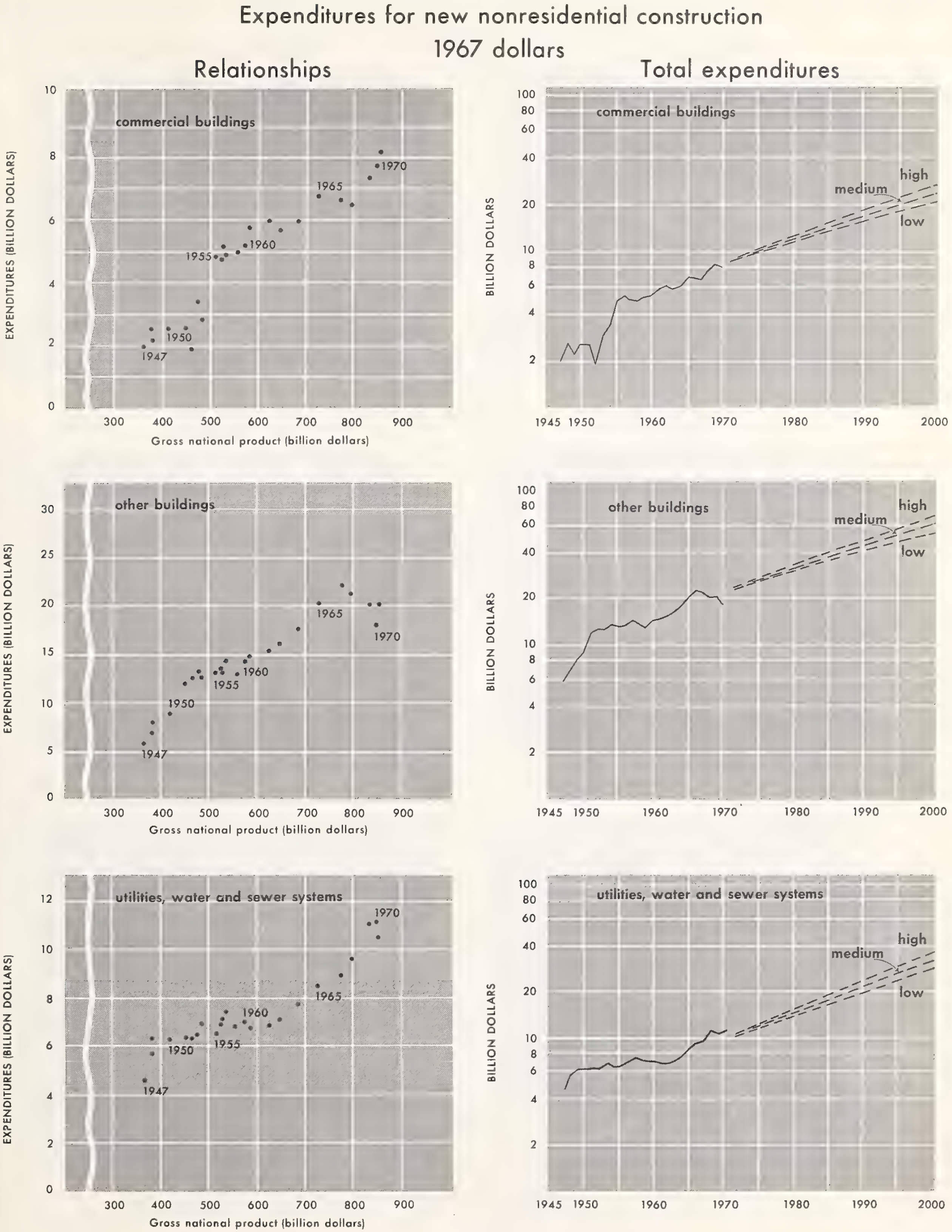
Projections based on those relationships, and the assumed increases in the gross national product, indicate a continuing strong rise in expenditures for new nonresidential construction through the 1970–2000 period but at a declining rate in most classes. The drop in projected growth rates is largest for highways—a reflection of the expectation that the big increases in expenditures in the late 1950's and 1960's associated with funding of the interstate highway system will not be repeated. On the other hand, assumed increases in rates of growth in expenditures for utilities, and water and sewer systems are based on the expectation that increases will be necessary to maintain or improve the environment.

The major part ot the lumber consumed in nonresidential construction in 1970 was used in connection with concrete forming or other facilitating uses. The remainder went into structural uses such as decking, joists, rafters, beams, and prefabricated trusses and arches.

Most of the plywood consumed in 1970 also was used for facilitating purposes, primarily for the forming of concrete. The largest part of the building board consumed, was used for structural purposes such as decking, subflooring, and sheathing.

Timber Products Use Per Dollar of Construction Expenditure

The drop in consumption of lumber in the 1962–70 period reflected a general decline in the use of



Expenditures for new nonresidential construction

1967 dollars

Relationships

Total expenditures

Figure 63

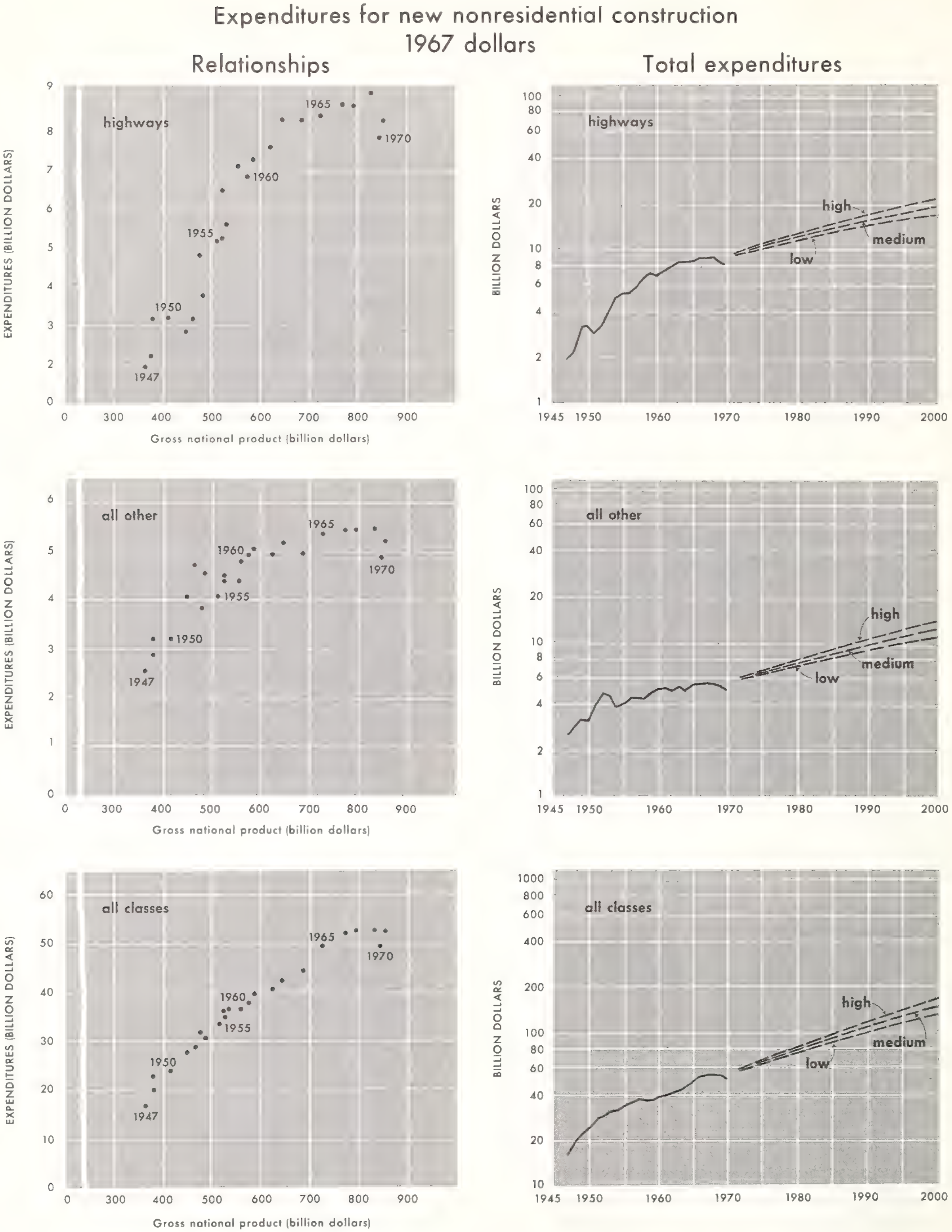


Figure 63—Continued

TABLE 126.—*Timber products consumed in new nonresidential construction, by major product, 1962 and 1970, with projections (1970 relative prices) to 2000*

Year	Lumber		Plywood (⅜-inch basis)		Building board [1] (½-inch basis)	
	Total	Use per $1,000 of expenditures [2]	Total	Use per $1,000 of expenditures [2]	Total	Use per $1,000 of expenditures [2]
	Million board feet	*Board feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*
1962	3, 040	75	1, 280	28	430	11
1970	2, 610	53	1, 700	34	720	14. 5
			Low projections			
1980	2, 920	39	2, 580	35	1, 030	14
1990	3, 360	34	3, 260	33	1, 280	13
2000	3, 880	30	4, 050	31	1, 420	11
			Medium projections			
1980	3, 030	39	2, 680	35	1, 080	14
1990	3, 630	34	3, 530	33	1, 380	13
2000	4, 360	30	4, 550	31	1, 600	11
			High projections			
1980	3, 150	39	2, 800	35	1, 120	14
1990	3, 920	34	3, 800	33	1, 490	13
2000	4, 890	30	5, 100	31	1, 790	11

[1] Includes hardboard, particleboard, insulation board.

[2] 1967 dollars. Use per $1,000 of construction expenditure for 1962 and 1970 computed by Forest Service. (See table 125 for construction expenditures.)

Source: Timber products use, 1962 and 1970, estimates based on Forest Service surveys except highways, which were adapted from data provided by U.S. Department of Transportation, Bureau of Public Roads.

Projections: U.S. Department of Agriculture, Forest Service.

lumber per dollar of expenditure in most classes of construction, and some fall-off in construction activity in 1970. Plywood consumption per dollar also dropped in some classes, but there were substantial increases in noncommercial buildings, highways, and the "all other" class. Use of building board per dollar of construction expenditure rose in all classes.

These trends in use of timber products per dollar of expenditures reflect many technological and institutional forces. For example, boards and dimension lumber were formerly used for nearly all concrete form work. When plywood with synthetic glues came into wide use in the 1950's, plywood was substituted to an increasing degree for form lumber. Increased durability of plywood panels, which permitted a larger number of reuses, has more recently had important effects on the consumption of plywood. Growing use of rented metal forms in concrete form work has likewise become important. With development of steel frames and connecting devices some supporting dimension lumber also has been eliminated.

Growing use of metal studs, joists, and decking has also contributed to the decline in lumber use per dollar. Increased off-site forming of precast and prestressed concrete beams and decking in lieu of on-site forming have further reduced use of forming lumber and plywood per unit of nonresidential construction. And finally, use of timber products in nonresidential construction has been strongly influenced by building code restrictions and growing urbanization, with an associated growth in demand for large high-rise structures, constructed almost entirely of steel and concrete.

In contrast to the above forces, which have acted to reduce the demand for timber products there have been other developments which have tended to increase use. Use of structural wood items such as beams, trusses, and arches has been growing, especially in churches, supermarkets, schools, and warehouses. Certain architectural styles, such as the recent revival of the mansard roof, have also increased use of framing lumber and plywood.

Projected Demand for Timber Products in New Nonresidential Construction

With respect to the future, it has been assumed that the forces affecting demand will continue to reduce use of timber products per dollar of expenditures (table 126, fig. 64; Append. V, tables 7–9). The projected declines are not enough to offset expected increases in expenditure, however, and as a result projected demands for timber products at 1970 relative prices increase through the projection period. Projected demand for lumber by 2000 reaches 4.4 billion board feet (medium projection and 1970 prices)—some 67 percent above 1970. Projected demand for plywood under these assumptions rises about 2.7 times in the 30-year period, and demand for building board more than doubles.

DEMAND FOR TIMBER PRODUCTS IN RAILROAD CONSTRUCTION

In 1970 close to a billion board feet of lumber, nearly all in the form of ties, and about 25 million square feet (⅜-inch basis) of plywood were used by the railroad industry in the maintenance and construction of tracks and freight cars.

Substantial volumes of lumber and plywood were also used in the construction and maintenance of nonresidential structures used by railroads and in the manufacture of freight cars. Information on past use and projected demands for timber products in these uses is included in other sections of this report dealing with nonresidential construction and manufacturing.

Between the 1920's and the early 1960's, the number of railway crossties used annually dropped from an average of about 96 million to less than 15 million (table 127). The downward trend in use reflected a major reduction in construction of new track, a drop in railroad track mileage, increased average life of ties resulting from use of wood preservatives, use of various devices to reduce mechanical wear and splitting of wood ties, use of welded track, and a shift to diesel locomotives with reduced track wear.

Since the early 1960's the long downward trend in crosstie use has reversed and the number consumed has been rising slowly. This rise is expected to continue because of the growing need for improved track maintenance and some decline in average tie life resulting from the trend toward heavier wheel loads, higher speed trains, and the growing volume of rail traffic.

Replacement demand for crossties has therefore been projected to rise to 31 million (medium projection at 1970 relative prices) by 1980 and remain at or slightly below this level through 2000. This rate of replacement implies an average tie life of about 30 years. It also assumes there will be no substantive reduction in the mileage of track operated.

Total demand for both crossties and switch and bridge ties is projected to rise to 1.4 billion board feet by 2000—some 1.6 times consumption in 1970.

In addition to ties, an estimated 200 million board feet of lumber and 25 million square feet (⅜-inch basis) of plywood was used annually in the 1960's in the construction and repair of railroad cars in industry owned facilities. Such factors as growing numbers of freight cars, increasing size of cars, and the use of heavier decking, will tend to increase demands for lumber and plywood in car repair. Changes in the types of cars, however, and use of other materials in car construction appear likely to limit demands for lumber and plywood. In view of these considerations demand for lumber for car construction and repair within the railroad industry has been projected at 300 million board feet, and demand for plywood at 50 million square feet, in all projection years.

DEMAND FOR TIMBER PRODUCTS IN MANUFACTURING

About a tenth of the lumber, veneer and plywood, and a third of the hardboard and particleboard, consumed in 1970 was used in the manufacture of a wide range of products such as furniture, truck bodies and other items listed in footnotes to table 128.

These products have been divided into five groups, including: (1) household furniture, (2) commercial and institutional furniture, (3) consumer goods, (4) commercial and industrial equipment, and (5) other products. Products in each group have more or less similar characteristics in relation to timber products use, and similar relationships to basic determinants of demand such as gross national product or per capita disposable personal income.

In addition to these specified manufactured items, substantial volumes of timber products are used in other manufactured goods such as pallets, prefabricated wooden buildings and structural members, containers, mobile homes, millwork, and flooring. Information on use and projected demands for timber products in the manufacture of these items is included in other sections of this report dealing with construction and shipping.

Timber Products Use in Manufacturing

Consumption of timber products in the manufacture of goods included in this section increased substantially in the 1960's (table 128).[28] The most

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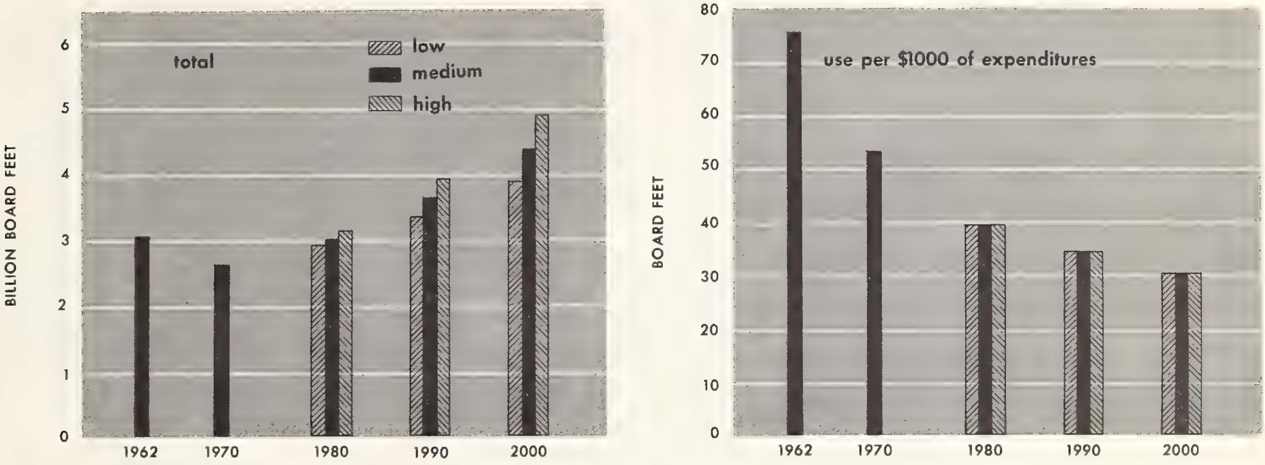
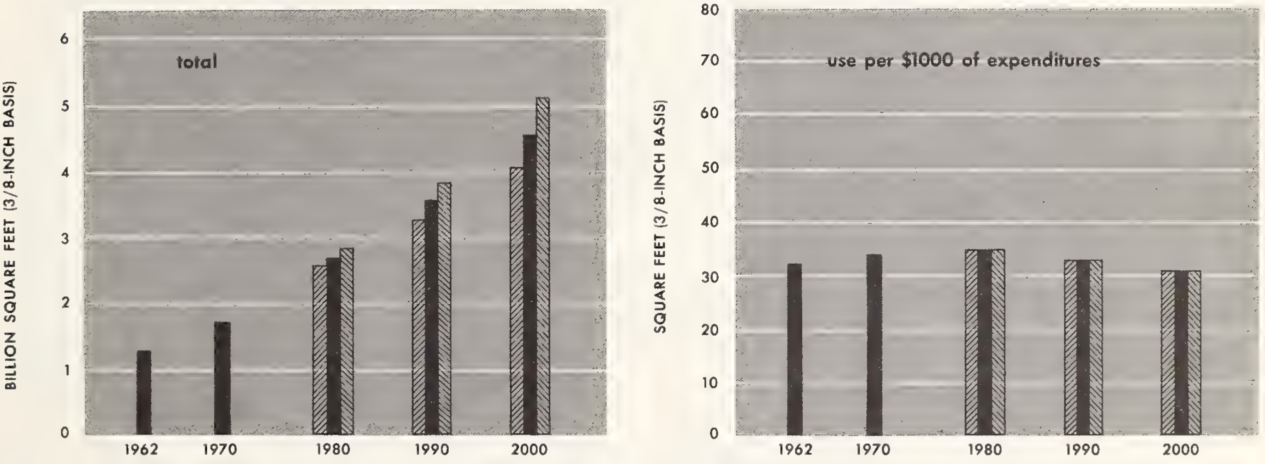
[28] The data for 1948, 1960, and 1965 shown in table 128 were obtained from Forest Service surveys of wood used in manufacturing industries. The 1970 estimates were updated from 1965 on the basis of changes in value of shipments and trends in wood use per dollar of shipments.

Timber products consumed in new nonresidential construction 1962 and 1970, with projections to 2000

Lumber



Plywood



Building board

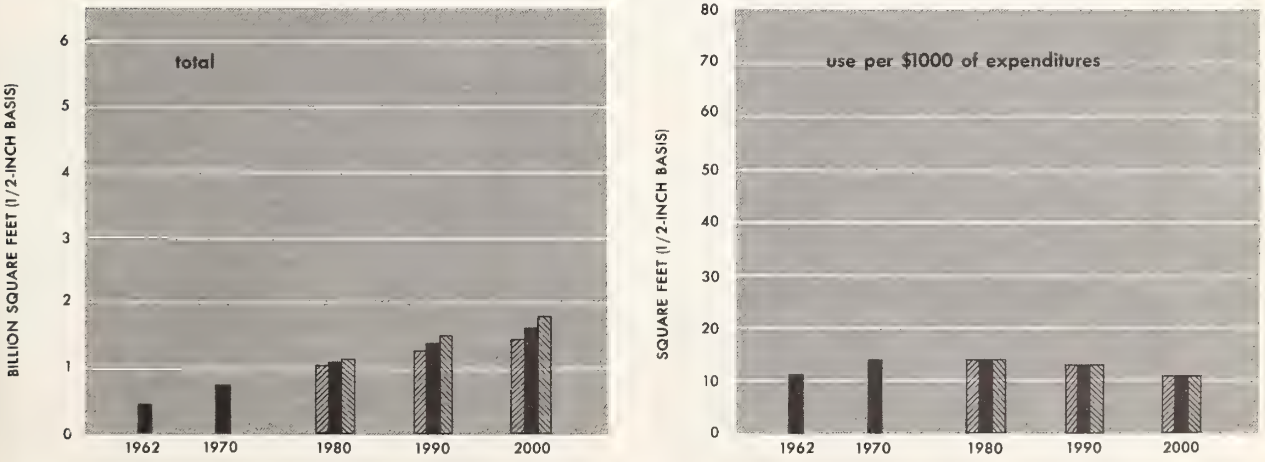


Figure 64

TABLE 127.—*Railway mileage, and ties consumed, 1920–70, with projections (1970 relative prices) to 2000*

Year	Mileage of track operated		Crossties per mile of track	Tie consumption							
				Total volume	Crossties						Switch and bridge ties, volume
					Total		In replacement		In new track		
	Total	Laid on crossties			Number	Volume	Number	Volume	Number	Volume	
	Thousand miles	*Thousand miles*	*Number*	*Million board feet*	*Thousands*	*Million board feet*	*Thousands*	*Million board feet*	*Thousands*	*Million board feet*	*Million board feet*
1920–29 [1]	400.4	372.4	----------	3,598	96,400	3,278	90,000	3,060	6,400	218	320
1930–39 [1]	399.9	371.9	2,986	2,085	52,506	1,890	50,552	1,820	1,954	70	195
1940–49 [1]	378.3	351.8	3,000	2,000	48,353	1,837	45,111	1,714	3,242	123	163
1950–59 [1]	369.8	343.9	3,015	1,262	29,523	1,151	26,431	1,031	3,092	121	111
1960	360.6	335.3	3,017	745	17,370	677	15,150	591	2,220	86	68
1961	357.9	332.9	3,017	622	14,210	554	12,719	496	1,489	58	68
1962	354.5	329.6	3,018	693	16,090	628	14,209	555	1,881	73	65
1963	352.3	327.7	3,019	687	16,000	624	14,463	564	1,537	60	63
1964	350.0	325.5	3,079	750	17,544	684	15,629	609	1,915	75	66
1965	348.0	323.6	3,016	776	18,198	710	15,817	617	2,381	93	66
1966	346.6	322.3	3,021	807	18,979	740	16,436	641	2,543	99	67
1967	344.9	320.8	3,032	832	18,652	765	16,093	660	2,559	105	67
1968	343.1	319.1	3,031	899	20,322	833	18,323	751	1,999	82	66
1969	341.5	317.6	3,031	899	21,363	833	18,556	724	2,807	109	66
1970	340.0	316.2	3,030	880	20,915	816	19,336	754	1,579	62	64
Low projections											
1980	330.0	307.0	3,030	1,250	29,550	1,180	28,190	1,130	1,360	50	70
1990	325.0	302.0	3,025	1,260	29,590	1,190	27,680	1,110	1,910	80	70
2000	322.0	299.0	3,020	1,270	30,050	1,200	27,360	1,090	2,690	110	70
Medium projections											
1980	330.0	307.0	3,030	1,370	32,450	1,300	31,010	1,240	1,440	60	70
1990	325.0	302.0	3,025	1,380	32,570	1,310	30,450	1,220	2,120	90	70
2000	322.0	299.0	3,020	1,400	33,240	1,330	30,100	1,200	3,140	130	70
High projections											
1980	330.0	307.0	3,030	1,510	35,960	1,440	34,450	1,380	1,510	60	70
1990	325.0	302.0	3,025	1,520	36,170	1,450	33,840	1,350	2,330	100	70
2000	322.0	299.0	3,020	1,550	37,060	1,480	33,440	1,340	3,620	140	70

[1] Data shown are annual averages for the decade.

Note: Data on tie consumption by class I railroads as reported by the ICC have been adjusted to include consumption by all railroads.

Sources: U.S. Interstate Commerce Commission, Bureau of Transport Economics and Statistics. 1920–53—*Statistics of railways in the United States;* 1954–1970—*Transportation Statistics in the United States.*

Projections: U.S. Department of Agriculture, Forest Service.

rapid growth was for particleboard, with consumption rising from 106 to 669 million square feet (¾-inch basis), and for hardboard, with use growing from 760 to 1,361 million square feet (⅛-inch basis). Lumber consumption also increased from 3.9 to 4.7 billion board feet in the 1960's, but veneer and plywood use remained close to 1.7 billion square feet (⅜-inch basis). These recent trends reflect both growth in the volume of production of manufactured products, and technological changes which have affected the kinds and amounts of materials consumed.

Manufacture of household furniture has been by far the largest end use of timber products, accounting for more than 60 percent of the total lumber and particleboard used in manufacturing in 1970 and about half the veneer and plywood and hardboard consumed. Moreover, use of timber products in household furniture manufacture has grown substantially in the past two decades. Wood use by other product groups listed above has increased only moderately or has declined in recent years.

Shipments of Manufactured Products

Between 1960 and 1970, the value of shipments of the household furniture industry, measured in constant 1967 dollars and based on trend values, rose by an average of 4.5 percent annually (table 129, fig. 65). Value of shipments on a per capita basis also increased during this decade, rising by 3.3 percent per year (Append. V, table 10).

Changes in the per capita value of household furniture shipments during recent years have been closely correlated with changes in per capita disposable personal income (fig. 65). Projections of the value of shipments of the household furniture industry based on this relationship, and on the population and income assumptions presented earlier in this chapter, increase threefold by 2000 (medium projection).

TABLE 128.—*Timber products consumed in manufacturing, by product group, 1948, 1960, 1965 and 1970*

Year and product group	Lumber	Veneer and plywood (3/8-inch basis)	Hardboard (1/8-inch basis)	Particleboard (3/4-inch basis)
	Million board feet	*Million square feet*	*Million square feet*	*Million square feet*
1948:				
Household furniture	1, 970	592	NA	NA
Commercial and institutional furniture	321	274	NA	NA
Consumer goods [1]	723	57	NA	NA
Commercial and industrial machinery and equipment [2]	518	73	NA	NA
Other products [3]	392	130	NA	NA
Total	3, 924	1, 126	NA	NA
1960:				
Household furniture	2, 116	877	231	58
Commercial and institutional furniture	289	342	145	34
Consumer goods [1]	643	246	30	5
Commercial and industrial machinery and equipment [2]	414	75	58	7
Other products [3]	403	282	296	2
Total	3, 865	1, 822	760	106
1965:				
Household furniture	2, 987	789	526	312
Commercial and institutional furniture	280	230	138	119
Consumer goods [1]	518	273	43	10
Commercial and industrial machinery and equipment [2]	619	170	41	16
Other products [3]	205	100	387	19
Total	4, 609	1, 562	1, 135	476
1970:				
Household furniture	2, 961	838	663	427
Commercial and institutional furniture	271	227	127	179
Consumer goods [1]	621	303	48	14
Commercial and industrial machinery and equipment [2]	620	179	49	19
Other products [3]	197	109	474	30
Total	4, 670	1, 656	1, 361	669

[1] Includes sporting goods, musical instruments, boat building and repair, toys and games, luggage and trunks, handles, wood pencils, morticians' goods, shoe and boot findings, and wood matches.

[2] Includes commercial refrigeration, signs and displays, patterns and jigs, truck bodies and trailers, general machinery, agricultural implements, electrical equipment, and textile machinery supplies.

[3] All manufactured products except those listed above and products such as pallets, prefabricated wooden buildings and structural members, containers, mobile homes, millwork, flooring, and other similar goods included in the construction and shipping sections of this study.

Sources: U.S. Department of Agriculture, Forest Service. 1948—*Wood used in manufacture, 1948*. Forest Resource Rep. 2. 1951; 1960—*Wood used in manufacturing industries, 1960*. Stat. Bull. 353. 1965; 1965—*Wood used in manufacturing industries, 1965*. Stat. Bull. 440. 1969; 1970—Based on preliminary estimates of value of shipments (table 129) and trends in timber products use per dollar of shipments (table 130).

Annual rates of growth show a substantial decline over the projection period from 4.5 percent in the 1960's to 3.4 percent in the 1990's.

Shipments of the other manufactured products included in this section also rose substantially in the 1948–70 period, although there were significant differences in rates of growth (table 129, fig. 65). Despite such differences, there was a close relationship between changes in the value of shipments of each group of products and changes in gross national product or disposable personal income.

Projections to 2000 based on these past relationships vary from less than a threefold increase for "other products" to over a fivefold increase for commercial and industrial equipment (medium projection at 1970 prices).[29] As in the case of household furniture, assumed rates of increase in

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[29] Separate projections of value of shipments were prepared for each of the important wood-using products listed in footnotes to table 129, based upon recent relationships between changes in the value of shipments and changes in gross national product or disposable personal income. These separate projections were then added together to obtain totals for major categories.

Value of shipments of manufactured products
1967 dollars

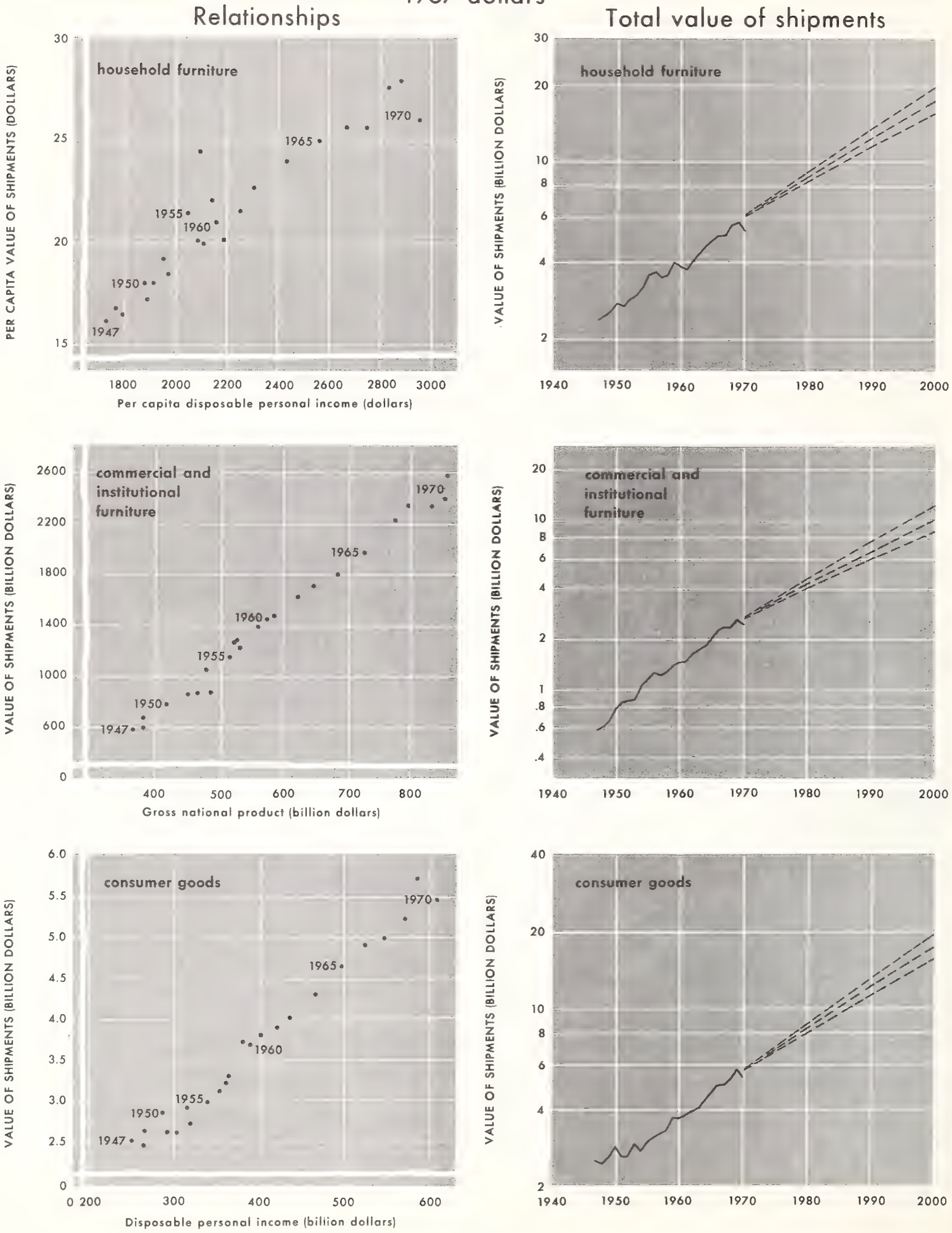

Figure 65

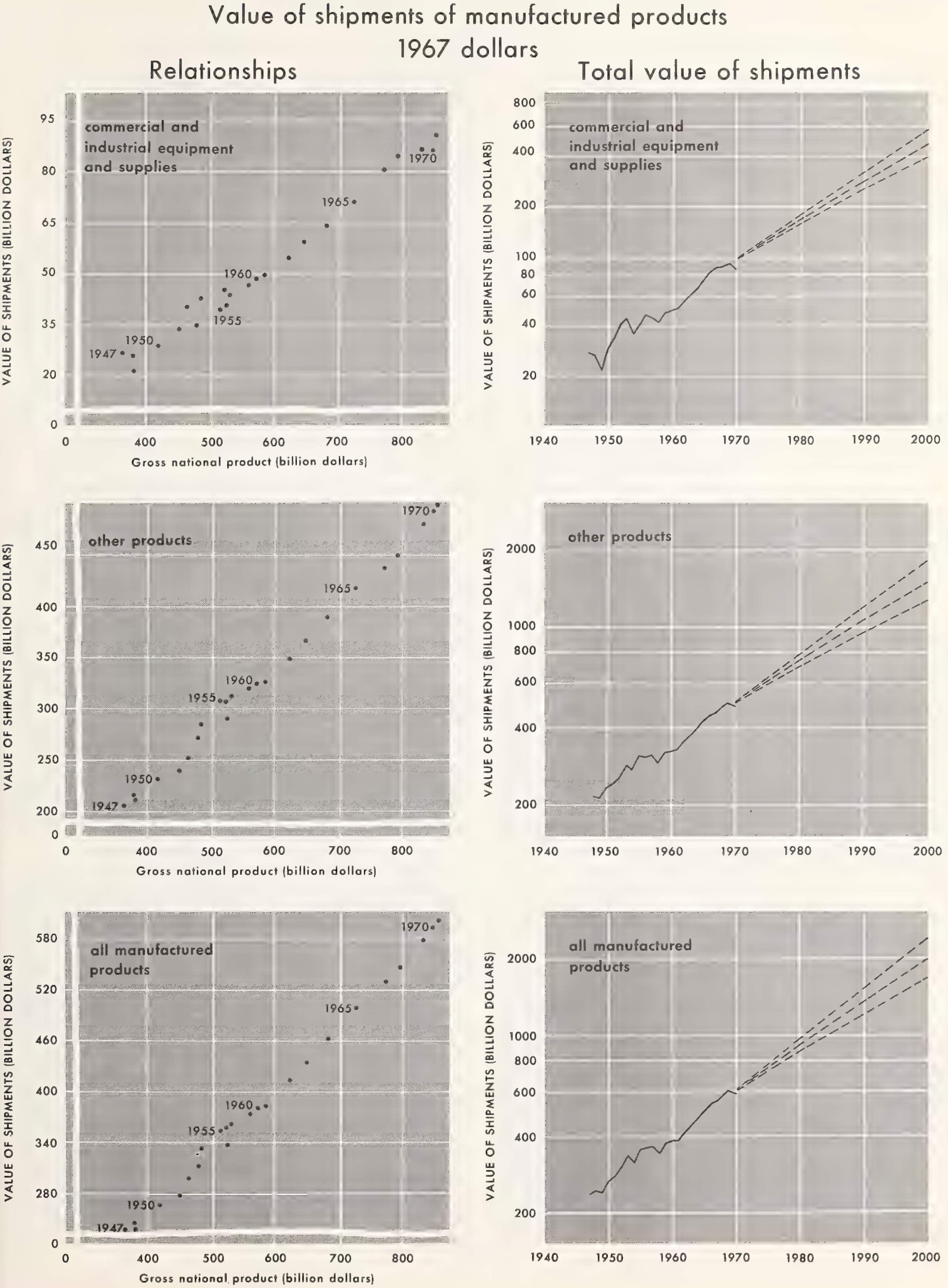

Figure 65—Continued

TABLE 129.—*Value of manufacturing shipments by product group, specified years 1948–70, with projections to 2000*

Year	All products		Household furniture		Commercial and institutional furniture		Consumer goods [1]		Commercial and industrial equipment [2]		Other products [3]	
	Value	Annual rate of increase	Value	Annual rate of increase	Value	Annual rate of increase	Value	Annual rate of increase	Value	Annual rate of increase	Value	Annual rate of increase
	Billions of 1967 dollars	*Percent*	*Billions of 1967 dollars*	*Percent*	*Billions of 1967 dollars*	*Percent*	*Billions of 1967 dollars*	*Percent*	*Billions of 1967 dollars*	*Percent*	*Billions of 1967 dollars*	*Percent*
1948	244.0	----------	2.4	----------	0.6	----------	2.4	----------	25.5	----------	213.1	----------
1950	265.2	4.3	2.7	6.1	.8	13.3	2.8	7.8	28.0	4.9	230.9	4.1
1955	352.7	5.9	3.5	5.4	1.1	8.3	3.0	1.0	39.0	6.9	306.1	5.8
1960	380.8	1.6	3.8	1.3	1.4	4.9	3.7	4.2	47.8	4.2	324.1	1.2
1965	498.1	5.5	4.9	5.2	2.0	6.4	4.6	4.9	70.5	8.1	416.1	5.1
1966	528.0	6.0	5.0	3.8	2.2	12.3	4.9	5.6	80.0	13.4	435.9	4.7
1967	545.2	3.3	5.1	1.2	2.3	5.3	5.0	1.7	84.1	5.1	448.7	3.0
1968	577.0	5.8	5.6	8.9	2.3	.1	5.2	5.0	86.0	2.3	477.9	6.5
1969	601.5	4.2	5.7	2.2	2.6	10.1	5.7	9.0	89.7	4.4	497.8	4.15
1970	591.6	−1.6	5.3	−6.5	2.4	−7.1	5.4	−4.6	85.0	−5.3	493.5	−.87
1948–70	----------	4.1	----------	3.6	----------	6.5	----------	3.7	----------	5.6	----------	3.9
Low projections												
1980	856.4	[4] 3.5	8.3	[4] 3.4	4.0	[4] 4.3	8.0	[4] 3.8	152.7	[4] 4.9	683.4	[4] 3.2
1990	1,197.7	3.4	11.4	3.2	5.9	4.0	11.2	3.9	241.8	4.7	927.4	3.1
2000	1,661.4	3.3	15.3	3.0	8.4	3.7	15.4	3.3	375.9	4.5	1,246.4	3.0
Medium projections												
1980	907.0	[4] 4.1	8.6	[4] 3.8	4.2	[4] 4.8	8.3	[4] 4.2	161.7	[4] 5.5	724.2	[4] 3.8
1990	1,343.3	4.0	12.3	3.6	6.5	4.5	12.0	3.8	271.0	5.3	1,041.5	3.7
2000	1,964.0	3.9	17.2	3.4	9.9	4.3	17.3	3.7	445.7	5.1	1,473.9	3.5
High projections												
1980	962.1	[4] 4.7	9.1	[4] 4.4	4.5	[4] 5.5	8.6	[4] 4.6	172.8	[4] 6.2	767.1	[4] 4.4
1990	1,512.1	4.6	13.5	4.0	7.4	5.2	13.0	4.2	309.4	6.0	1,168.8	4.3
2000	2,358.5	4.5	19.5	3.8	12.1	5.0	19.5	4.1	543.7	5.8	1,763.7	4.2

[1] Includes sporting goods, musical instruments, boat building and repair, toys and games, luggage and trunks, handles, wood pencils, morticians' goods, shoe and boot findings, and wood matches.

[2] Includes commercial refrigeration, signs and displays, patterns and jigs, truck bodies and trailers, general machinery, agricultural implements, electrical equipment, and textile machinery supplies.

[3] All manufactured products except those listed above and products such as pallets, prefabricated wooden buildings and structural members, containers, mobile homes, millwork, flooring, and other similar goods included in the construction and shipping sections of this study.

[4] Rates of increase calculated from the following 1970 trend values: all products, $606.9 billion; household furniture, $5.9 billion; commercial and institutional furniture, $2.63 billion; consumer goods, $5.5 billion; commercial and industrial equipment, $94.2 billion; other products, $498.7 billion.

Note: Conversion to 1967 dollars by U.S. Department of Agriculture, Forest Service. Annual rates of increase are calculated for 5-year periods from 1950 through 1965, for 1-year periods 1965 through 1970, and for 10-year periods 1970 through 2000.

Sources: Values of shipments, U.S. Department of Commerce. 1948 and 1950—*Value of shipments of selected classes of products, for the United States.* Bureau of the Census, MAS-53 (Final). 1955; 1955—*Value of shipments of selected classes of products, for the United States.* Bureau of the Census, MA-57-2. 1959; 1960–69—*Growth in shipments by classes of manufactured products.* Bureau of Domestic Commerce. 1971; 1970—Preliminary Forest Service estimates based on data published in *General statistics for industry groups and industries.* Bureau of the Census, M-70 (AS)-1. 1972.

Projections: U.S. Department of Agriculture, Forest Service.

value of shipments drop significantly over the projection period for all product groups.

Timber Products Use Per Dollar of Shipments

There have been divergent trends in use of lumber and other timber products per dollar of shipments of manufactured products (table 130). Use of lumber and veneer and plywood dropped substantially in most product groups, while there were fairly large increases in the use of hardboard and particleboard (Append. V, tables 11–14).

Part of the decline in use of lumber and plywood per dollar of shipments reflects inroads of alternative materials. Plastics have become particularly important substitutes in furniture manufacture. In this industry use of plastic resins has grown from a reported 317 million pounds in 1965,[30] to 702 million pounds in 1970.[31] In the latter year plastics composed roughly 12 percent of the combined volume of wood and plastics used in the furniture industry.

This rapid growth in use of plastics in furniture manufacture was a result of a number of forces.[32] Production costs of mass-produced plastic furni-

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[30] Wood, Stuart. How are furniture people faring in the strange world of plastics? Here's how in their own words. Modern Plastics 45(11):176–197. 1968.

[31] ——— Furniture, Phase II. Modern Plastics 47(8):56–60. 1970.

[32] Anonymous. A plastic trend in furniture's future. Business Week 2144:112–113. Sept. 26, 1970.

Clark, Edward L. Plastics and the future of the furniture industry in the United States. Forest Prod. J. 21(8):14–16. 1971.

TABLE 130.—*Timber products consumed in manufacturing, specified years 1948–70, with projections (1970 relative prices) to 2000*

Year	Lumber		Veneer and plywood (⅜-inch basis)		Hardboard (⅛-inch basis)		Particleboard (¾-inch basis)	
	Total	Per dollar of shipments [1]	Total	Per dollar of shipments [1]	Total	Per dollar of shipments [1]	Total	Per dollar of shipments [1]
	Million board feet	*Board feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*
1948	3, 924	0. 016	1, 126	0. 005	NA	------------	NA	------------
1960	3, 865	. 010	1, 822	. 005	760	0. 0020	106	0. 0003
1965	4, 609	. 009	1, 562	. 003	1, 135	. 0023	476	. 0010
1970	4, 670	. 008	1, 656	. 003	1, 361	. 0023	669	. 0011
				Low projections				
1980	5, 480	. 006	2, 290	. 003	2, 140	. 0025	1, 330	. 0016
1990	6, 290	. 005	2, 950	. 002	3, 050	. 0025	2, 100	. 0018
2000	7, 140	. 004	3, 760	. 002	4, 230	. 0025	3, 090	. 0019
				Medium projections				
1980	5, 720	. 006	2, 400	. 003	2, 240	. 0025	1, 400	. 0015
1990	6, 850	. 005	3, 220	. 002	3, 350	. 0025	2, 300	. 0017
2000	8, 130	. 004	4, 300	. 002	4, 850	. 0025	3, 540	. 0018
				High projections				
1980	6, 040	. 006	2, 530	. 003	2, 370	. 0025	1, 480	. 0015
1990	7, 560	. 005	3, 570	. 002	3, 720	. 0025	2, 560	. 0017
2000	9, 360	. 004	5, 010	. 002	5, 650	. 0025	4, 140	. 0018

[1] 1967 dollars. Use per dollar of shipments in the 1948–70 period computed by Forest Service (see table 129 for value of shipments).

Sources: Timber products use, U.S. Department of Agriculture, Forest Service. 1948—*Wood used in manufacture, 1948.* Forest Resource Rep. 2. 1951; 1960—*Wood used in manufacturing industries, 1960.* Stat. Bull. 353. 1965; 1965—*Wood used in manufacturing industries, 1965.* Stat. Bull. 440. 1969; 1970—Based on preliminary estimates of value of shipments (table 129) and trends in timber products use per dollar of shipments.

Projections, U.S. Department of Agriculture, Forest Service.

ture parts, especially the ornate highly detailed parts used in the manufacture of Spanish and Mediterranean styles of furniture, were reportedly below the costs of comparable parts made from lumber. In addition, plastics permit great freedom in design, and special effects not possible with lumber or other wood products, they have dimensional stability and resistance to damage from scratches and liquids. Shortages of skilled wood workers and rising costs of some fine hardwoods have also been contributing factors.

On the other hand, some forces favor use of timber products over plastics. Perhaps the most important of these is a deep seated consumer preference for wood furniture. In addition, timber products have some superior performance characteristics such as ease of refinishing and repair, greater fracture resistance, and higher load-bearing strength. Timber products also have a cost advantage over plastics for many furniture parts, especially those that are not produced in large numbers.

In the case of other manufactured products such as commercial and institutional furniture, boats, toys and handles, lumber and plywood have also been partially displaced by other nonwood materials such as steel or fiberglass having lower costs or preferred performance characteristics. Particleboard and hardboard have also partially displaced lumber and plywood in some manufactured products. This has been particularly important in furniture manufacture where particleboard is extensively used as core stock, and hardboard is used as facing material or components in such items as desks, bureaus, and cabinets.

Part of the decline in the use of lumber and plywood per dollar of shipments also reflects a general reduction in use of all raw materials per dollar of product value resulting from increases in the degree of processing of materials and rising relative costs of labor and capital per unit of production.

Projected Demand for Timber Products in Manufacturing

Projections of timber products use per dollar of shipments—shown in table 130 and Append. V, tables 11–14—have been based on (1) recent changes in materials use, (2) judgment as to the influence of technological and economic factors in future decades, and (3) 1970 relative prices of materials and production costs. In general, these projections indicate a continuation of recent trends, including further declines in the use of lumber and plywood and increased use of hardboard and particleboard.

In spite of the projected decreases in use of lumber and veneer and plywood per dollar of shipments, total demands rise for all products because of the major increases projected in total value of shipments (table 130, fig. 66; Append. V, table 11–14).

Projections of demand for lumber, for example, rise nearly 75 percent by 2000 (medium projection at 1970 prices) from 4.7 to 8.1 billion board feet. Related demands for veneer and plywood are projected to more than double. Projected demands are up about 3.6 times for hardboard, and increase about five times for particleboard.

The lumber and plywood used in manufactured products covered in this section consist largely of hardwoods. In the furniture industry, for example, 80 percent of the lumber, and three-fourths of the veneer and plywood, used in 1965 were hardwoods. Most of the hardwood lumber consumed has been produced from domestic species, and this is expected to continue through the projection period.

DEMAND FOR TIMBER PRODUCTS IN SHIPPING

In 1970 nearly 6 billion board feet of lumber and 600 million square feet of veneer and plywood (⅜-inch basis) were used in shipping, that is, for the manufacture of pallets, boxes, crates, hampers, baskets, and other wood containers; and for dunnage, blocking, and bracing required for the transportation, handling, and storage of industrial, agricultural, and military products (table 131).

The 1970 level of lumber consumption was about 36 percent above that of 1960. Use of veneer and plywood in 1970, on the other hand, was 48 percent below the 1960 level of use.

TABLE 131.—*Timber products consumed in shipping by end use 1948, 1960, 1965, and 1970*

Year and product	Lumber	Veneer and plywood	Hardboard
	Million board feet	*Million square feet*	*Million square feet*
1948:			
Containers, wood	3,997	1,672	NA
Pallets	220	1	NA
Dunnage, blocking, and bracing	740	(¹)	NA
Total	4,957	1,673	NA
1960:			
Containers, wood	1,864	1,125	13
Pallets	1,550	18	2
Dunnage, blocking, and bracing	800	1	1
Total	4,214	1,144	16
1965:			
Containers, wood	1,829	595	20
Pallets	2,200	75	16
Dunnage, blocking, and bracing	856	12	3
Total	4,885	682	39
1970:			
Containers, wood	1,755	437	26
Pallets	3,150	140	28
Dunnage, blocking, and bracing	820	14	4
Total	5,725	591	58

¹ Negligible.

Sources: Lumber for pallets: Forest Service estimates based on data published in: U.S. Department of Commerce, Business and Defense Administration. *Wooden pallets.* 1963; *Pallet industry growing by leaps and bounds.* Wood Construction and Building Materialist 56(11):26–27; *The Appalachian pallet industry.* The Northern Logger and Timber Processor 20(2):22–23, 60–61; *Pallets from low grade hardwoods.* Forest Prod. J. 13(3):11–13; U.S. Department of Agriculture, Forest Service. *Wood used in manufacturing industries, 1960.* Stat. Bull. 353. 1965.

All other: U.S. Department of Agriculture, Forest Service. 1948—*Wood used in manufacture, 1948.* Forest Resource Rep. 2. 1951; 1960—*Wood used in manufacturing industries, 1960.* Stat. Bull. 353. 1965; 1965—*Wood used in manufacturing industries, 1965.* Stat. Bull. 440. 1969; 1970—Forest Service estimates based on pallet production, value of shipments of containers, and trends in timber products use in dunnage, blocking, and bracing.

Demand for Timber Products in Pallets

Increased lumber use in shipping in the 1960's was entirely attributable to a major rise in pallet production. As new methods of materials handling were introduced, and new facilities geared to the use of pallets were constructed, pallet production doubled in the 1960's from 62 to 126 million units (table 132).

Since the mid-1950's there has been a close relationship between pallet output and manufacturing production (fig. 67). Projections based

Timber products consumed in manufacturing 1948 - 70, with projections to 2000

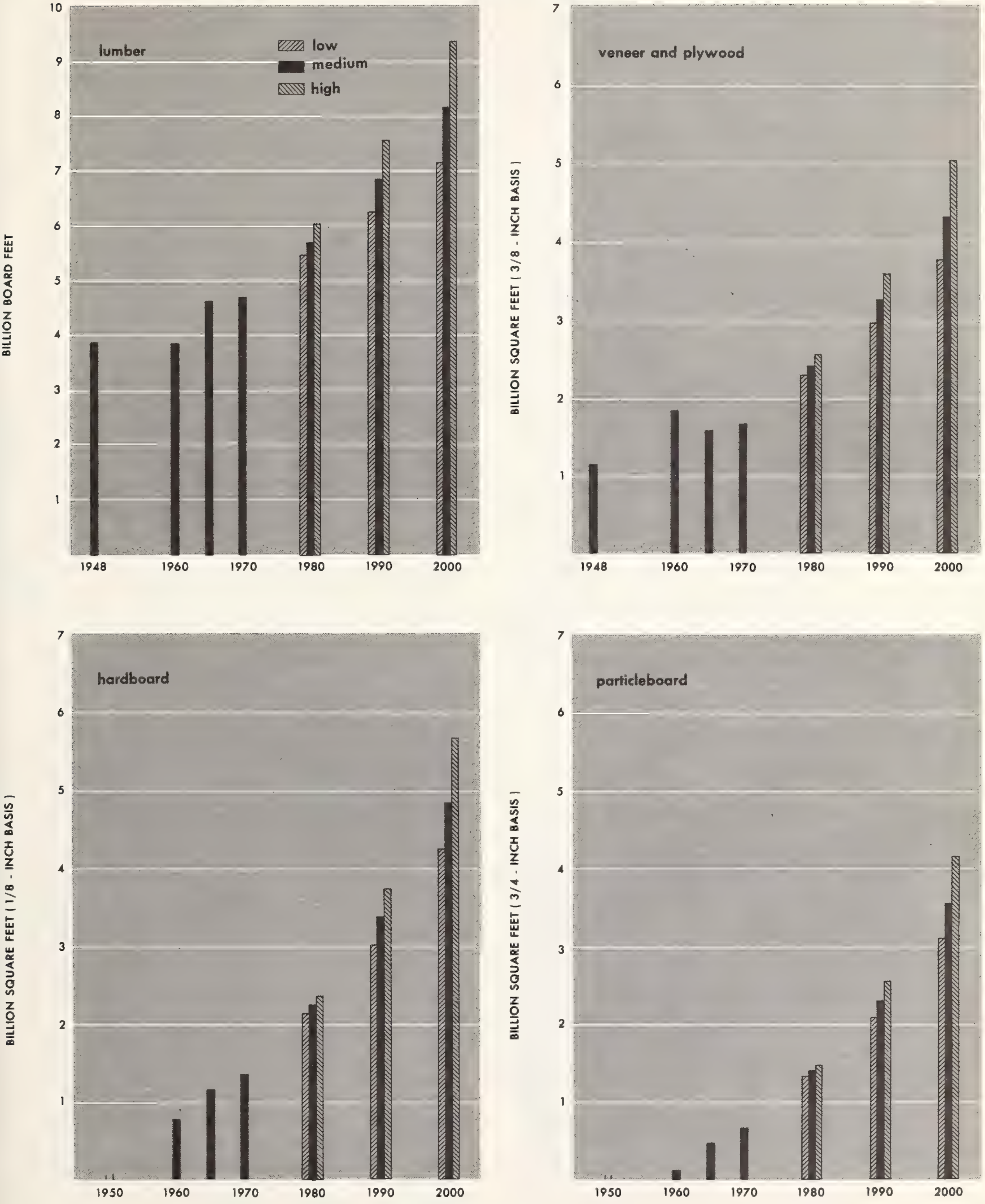

Figure 66

TABLE 132.—*Timber products consumed in the manufacture of pallets by product, specified years 1960–70, with projections of demand (1970 relative prices) to 2000*

Year	Pallet production	Lumber		Plywood (⅜-inch basis)		Hardboard (⅛-inch basis)	
		Use per pallet	Total	Use per pallet	Total	Use per pallet	Total
	Millions	*Board feet*	*Million board feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*
1960	62	25	1, 550	0. 29	18	0. 03	2
1965	88	25	2, 200	. 85	75	. 18	16
1970	126	25	3, 150	1. 11	140	. 22	28
Low projections							
1980	195	25	4, 880	1. 40	270	. 28	50
1990	250	25	6, 250	1. 68	420	. 33	80
2000	295	25	7, 370	1. 90	560	. 38	110
Medium projections							
1980	209	25	5, 220	1. 40	290	. 28	60
1990	278	25	6, 950	1. 68	470	. 33	90
2000	340	25	8, 500	1. 90	650	. 38	130
High projections							
1980	225	25	5, 600	1. 40	310	. 28	60
1990	310	25	7, 750	1. 68	520	. 33	100
2000	390	25	9, 750	1. 90	740	. 38	150

Sources: Pallet production, 1960, 1965, and 1970—Based on data supplied by the National Wooden Pallet and Container Association.

Wood use, see source note table 131.

Projections: U.S. Department of Agriculture, Forest Service.

Relationship of pallet production to index of manufacturing production

(1967 = 100)

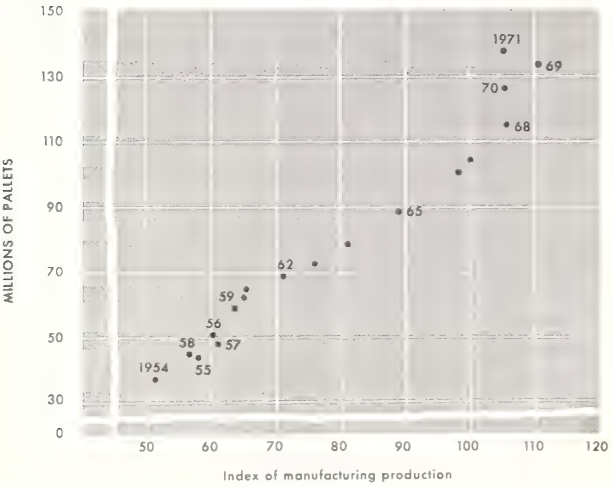

Figure 67

on this relationship and assumed growth in industrial production show continuing large increases in demand for pallets (table 132). The medium projection at 1970 relative prices, for example, rises nearly threefold by 2000. Rates of growth in projected pallet demand, however, drop rapidly from an average of 7.3 percent annually in the 1960's to 2.0 percent in the 1990's. Such a fall means that growth in demand for pallets associated with use in new materials handling systems gradually ends, and that the projected increases in demand depend to a greater and greater degree on growth in industrial and agricultural production.

Lumber use per pallet has averaged about 25 board feet in the last decade or so.[33] This average is assumed to continue, even though plywood, slice-wood, or other materials may be used to an increasing degree. Lumber use for pallets has, therefore, been projected to rise to some 8.5 billion board feet by 2000 (medium projection and 1970 prices)—some 2.7 times consumption in 1970 (table 132, fig. 68).

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[33] Anonymous. Pallet industry growing by leaps and bounds. Wood Construction and Building Materialist 56(11):26–27. 1970.

——— The Appalachian pallet industry. Northern Logger and Timber Processor 20(2):22–23, 60–61. 1971.

Baldwin, W. C. Pallets from low grade hardwoods. Forest Prod. J. 18(3):11–13. 1968.

U.S. Department of Commerce, Business and Defense Administration. Wooden pallets. 1963.

Small but increasing quantities of plywood and hardboard have been used in pallet manufacture. It was assumed that demand for these products would also rise in line with the projected demand for pallets.

Demand for Timber Products in Wooden Containers

Between 1948 and 1960, the value of shipments (in 1967 dollars) of wooden containers, that is, boxes and crates, wirebound boxes and crates, and veneer and plywood containers, dropped more than 38 percent (table 133). This fall off largely reflected continuing displacement of wooden containers by fiber and plastic containers, metal and fiber barrels and pails, and multiwall bags.

Several factors contributed to this displacement, including lower costs of substitute containers, lower shipping weights and associated freight costs, and adaptability to automated packaging and shipping operations. However, in packaging some items, such as large bulky products, delicate instruments, glass, ceramics, and certain fruits and vegetables, these advantages have been outweighed by the need for special protection.

Lumber consumed in shipping, 1948-70, with projections of demand to 2000

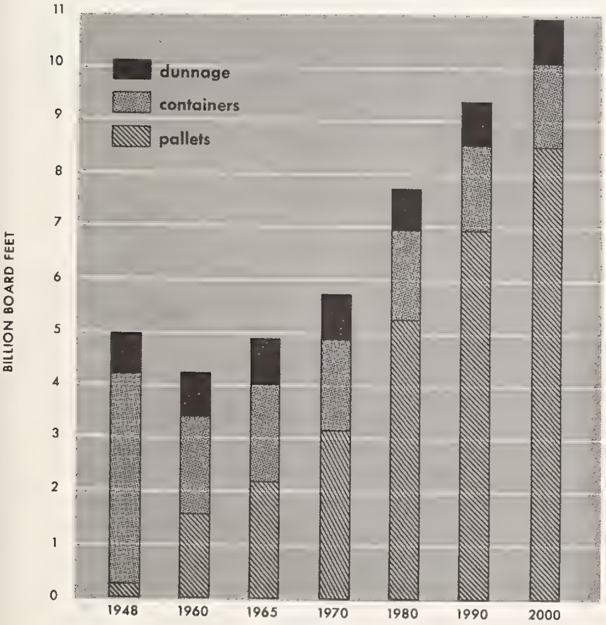


Figure 68

Since 1960, growing shipments of these latter items have led to a small rise in demand for wooden containers, as measured by value of shipments. In view of anticipated growth in manufacturing and agricultural production, continuing modest increases in the value of shipments of wooden containers have been projected.

The use of lumber and veneer and plywood per dollar of shipments of wooden containers has shown a consistent downward trend (table 133), reflecting such factors as greater use of paperboard and plastic containers and increases in containerized and bulk shipments. It seems likely that such trends will continue and use of lumber and veneer and plywood per dollar of shipments has therefore been projected to decline slowly.

These projected decreases in use per dollar of shipments roughly offset projected increases in total shipments. As a result, the medium projections of demand for lumber and veneer and plywood in wooden containers, at 1970 prices, remain close to recent levels through the 1970–2000 period.

Demand for Timber Products in Dunnage

In the past two decades use of lumber for dunnage, blocking, and bracing in railroad cars, trucks, and ships has amounted to an estimated 800 million board feet a year (table 131). This stability, in a period of rapid increases in the volume of goods transported, apparently reflects effects of growth in palletized, containerized, and bulk shipments. Growth in such shipments is expected to continue. The medium projection of demand for lumber for dunnage, blocking, and bracing at 1970 prices has therefore been projected to remain at about 800 million feet a year.

Projected Demand for Timber Products in Shipping

Projected total demand for lumber in shipping, that is pallets, containers, and dunnage rises rather sharply because of the projected growth in demand for pallets and by 2000 reaches 10.9 billion board feet (medium projection—1970 relative prices), nearly double consumption in 1970 (table 134, fig. 68). Projected demand for plywood and veneer rises to 1.1 billion square feet (⅜-inch basis) in 2000—about 1.8 times consumption in 1970.

DEMAND FOR TIMBER PRODUCTS IN MISCELLANEOUS USES

In addition to the major end uses covered above, an estimated 8.5 billion board feet of lumber and substantial quantities of plywood and building board were used in 1970 for other purposes (table 135). These included upkeep and

TABLE 133.—*Value of shipments and timber products consumed in the manufacture of wood containers by product, specified years 1948–70, with projections of demand (1970 relative prices) to 2000*

Year	Value of shipments	Lumber		Veneer and plywood (⅜-inch basis)		Hardboard (⅛-inch basis)	
		Use per dollar of shipments [1]	Total	Use per dollar of shipments [1]	Total	Use per dollar of shipments [1]	Total
	Millions of 1967 dollars	*Board feet*	*Million board feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*
1948	579	6.90	3,997	2.89	1,672	NA	NA
1960	358	5.20	1,864	3.14	1,125	0.036	13
1965	382	4.80	1,829	1.56	595	.052	20
1970	390	4.50	1,755	1.12	437	.067	26
Low projections							
1980	402	4.00	1,610	.94	380	.079	30
1990	416	3.63	1,510	.88	370	.086	40
2000	424	3.35	1,420	.84	360	.091	40
Medium projections							
1980	422	4.00	1,690	.94	400	.079	30
1990	452	3.63	1,640	.88	400	.086	40
2000	480	3.35	1,610	.84	400	.091	40
High projections							
1980	439	4.00	1,760	.94	410	.079	30
1990	490	3.63	1,780	.88	430	.086	40
2000	541	3.35	1,810	.84	450	.091	50

[1] 1967 dollars. Use per dollar of shipments computed by Forest Service.

Sources: Value of shipments, U.S. Department of Commerce, Bureau of the Census. 1948—*Value of shipments of selected classes of products*. Ser. MAS-53 (final). 1955; 1960 and 1965—*Growth in shipments by classes of manufactured products*. 1971; 1970—Forest Service estimate based on data published in *Annual survey of manufactures, 1970*. M-70 (AS)-1. 1972.

Timber products use, U.S. Department of Agriculture, Forest Service. 1948—*Wood used in manufacture, 1948*. Forest Resource Rep. 2. 1951; 1960—*Wood used in manufacturing industries, 1960*. Stat. Bull. 353. 1965; 1965—*Wood used in manufacturing industries, 1965*. Stat. Bull. 440. 1969; 1970—Forest Service estimates.

Projections: U.S. Department of Agriculture, Forest Service.

improvement of nonresidential structures; farm construction except housing; structures and roof supports in mines; made-at-home products such as furniture, boats, and picnic tables; and made-on-the-job products such as advertising and display structures.

There are no statistical data available showing actual consumption of timber products in these various uses. Accordingly, timber products use for these purposes was estimated by subtracting volumes of timber products consumed in the specific end uses discussed above from estimated total consumption of each product. This residual probably includes some volumes which may properly belong in the construction, manufacturing, or shipping sectors. The figures also include any statistical discrepancies associated with the estimates of production, imports, and exports used in estimating total consumption.

Because of the lack of a statistical base for projections of demand for these residual uses, it was assumed that demands for these uses would rise in line with projected demands for the total of all other items. Under this assumption, the medium level of demand for lumber in these "other" uses at 1970 prices rises to 12.9 billion board feet in 2000, some 53 percent above 1970. Projected demands nearly double for plywood and triple for building board.

TABLE 134.—*Timber products consumed in shipping by products, specified years 1948–70, with projections of demand (1970 relative prices) to 2000*

Year	Lumber	Veneer and plywood (⅜-inch basis)	Hardboard (⅛-inch basis)
	Million board feet	*Million square feet*	*Million square feet*
1948	4,957	1,674	NA
1960	4,214	1,144	16
1965	4,885	682	39
1970	5,725	591	58
Low projections			
1980	7,090	670	80
1990	8,360	810	120
2000	9,390	940	150
Medium projections			
1980	7,710	710	90
1990	9,390	890	130
2000	10,910	1,070	170
High projections			
1980	8,360	740	90
1990	10,530	980	140
2000	12,560	1,220	200

Sources: U.S. Department of Agriculture, Forest Service. 1948—*Wood used in manufacture, 1948*. Forest Resource Rep. 2. 1951; 1960—*Wood used in manufacturing industries, 1960*. Stat. Bull. 353. 1965; 1965—*Wood used in manufacturing industries, 1965*. Stat. Bull. 440. 1969; 1970—Forest Service estimates based on pallet production, value of shipments of containers, and trends in timber products use in dunnage, blocking, and bracing.

Projections: U.S. Department of Agriculture, Forest Service.

SUMMARY OF DEMAND PROJECTIONS FOR LUMBER, PLYWOOD, AND BUILDING BOARD

Lumber Consumption and Demand

Lumber consumption in all uses in 1970 was 39.5 billion board feet (tables 136 and 137, fig. 69; Append. V, table 15). This was about the same as the average annual consumption in the 1950's and 1960's. In 1972 lumber consumption rose to 47.4 billion board feet—20 percent more than in 1970 and above the record levels attained in the early 1900's when lumber was the chief raw material used in the U.S. for construction, manufactured products, and shipping materials.

Per capita consumption of lumber in the 1960's fluctuated around 200 board feet a year (Append. V, table 15). This was far below figures for the early 1900's when per capita use reached a high of over 500 board feet, and substantially under the average of 250 board feet in the early 1950's.

TABLE 135.—*Timber products consumed in miscellaneous uses,*[1] *1962 and 1970, with projections (1970 relative prices) to 2000*

Year	Lumber	Plywood (⅜-inch basis)	Building board (⅜-inch basis)
	million board feet	*million square feet*	*million square feet*
1962	6,450	3,356	----------------
1970	8,460	5,626	2,683
Low projections			
1980	10,040	8,080	4,615
1990	11,160	9,625	6,125
2000	11,540	10,480	7,520
Medium projections			
1980	10,610	8,470	4,840
1990	12,060	10,305	6,575
2000	12,930	11,640	8,400
High projections			
1980	11,230	8,885	5,065
1990	13,040	11,010	7,100
2000	14,670	13,185	9,575

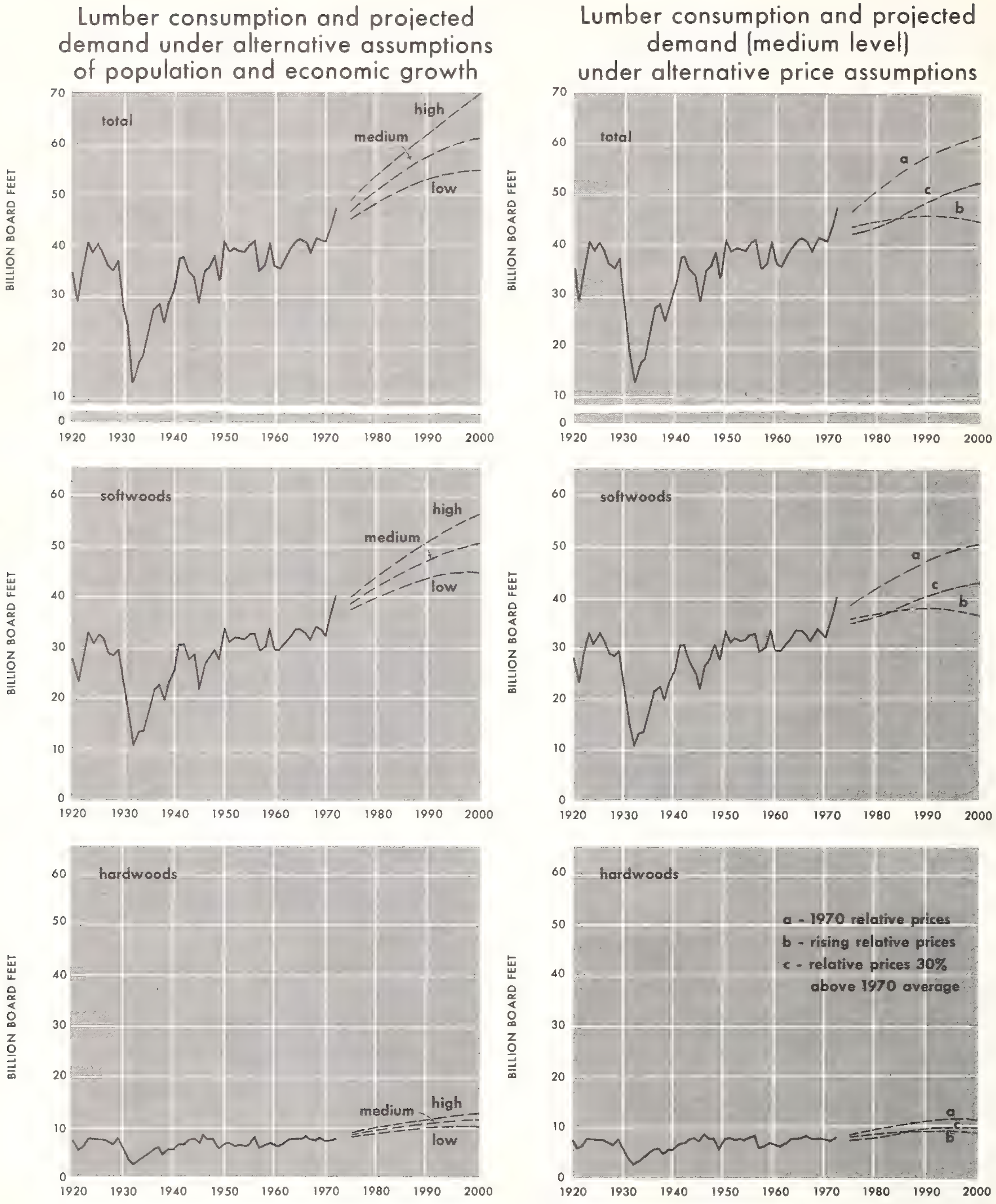
[1] Includes upkeep and improvement of nonresidential buildings and structures; farm construction except housing; mining; made-at-home projects such as furniture, boats, and picnic tables; made-on-the-job products like advertising and display structures; and a wide variety of other miscellaneous products and uses.

Nearly a third of the lumber consumed in 1970 went into the production of new housing (table 136). Residential upkeep and improvements accounted for 12 percent and nonresidential construction 9 percent of the total. Of the remainder, 14 percent was used in shipping, 12 percent in manufacturing, and 21 percent in all other uses.

Projected demand for lumber with alternative growth assumptions.—Projected demand for lumber at 1970 relative prices shows a rather sharp rise to a 1980 level of 51 billion board feet (medium level), or 224 board feet per capita. This growth is attributable largely to the projected rise in demands for housing and for pallets.

After 1980, and mostly because of the leveling off in the demand for housing, projected demand at 1970 prices increases more slowly to about 62 billion board feet in 2000 (medium level)—a volume some 1.6 times that of 1970.

In recent decades softwoods have composed around four-fifths of the lumber consumed. This proportion is expected to be maintained without much change.



Lumber consumption and projected demand under alternative assumptions of population and economic growth

Lumber consumption and projected demand (medium level) under alternative price assumptions

Figure 69

TABLE 136.—*Lumber consumption, by major end use, species group, and per capita use, 1962 and 1970, with projections (1970 relative prices) to 2000*

Item	1962	1970	Low projections[1]			Medium projections[1]			High projections[1]		
			1980	1990	2000	1980	1990	2000	1980	1990	2000
	Million board feet	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*
By end use:											
New housing	13, 940	12, 270	16, 160	17, 310	16, 000	17, 180	18, 650	17, 950	18, 240	20, 000	20, 770
Residential upkeep and improvements	4, 400	4, 690	5, 090	5, 560	5, 930	5, 060	5, 680	6, 140	5, 110	5, 770	6, 370
New nonresidential construction[2]	3, 930	3, 690	4, 470	4, 920	5, 450	4, 700	5, 310	6, 060	4, 960	5, 740	6, 740
Manufacturing	4, 240	4, 670	5, 480	6, 290	7, 140	5, 720	6, 850	8, 130	6, 040	7, 560	9, 360
Shipping	4, 340	5, 720	7, 090	8, 360	9, 390	7, 710	9, 390	10, 910	8, 360	10, 530	12, 560
All other uses[3]	6, 450	8, 460	10, 040	11, 160	11, 540	10, 610	12, 060	12, 930	11, 230	13, 040	14, 670
Total use	37, 300	39, 500	48, 240	53, 600	55, 450	50, 980	57, 940	62, 120	53, 940	62, 640	70, 470
By species group:											
Softwoods	30, 800	32, 100	39, 560	43, 420	44, 360	41, 800	46, 930	49, 700	44, 230	50, 740	56, 380
Hardwoods	6, 500	7, 300	8, 680	10, 180	11, 090	9, 180	11, 010	12, 420	9, 710	11, 900	14, 090
Total use	37, 300	39, 500	48, 240	53, 600	55, 450	50, 980	57, 940	62, 120	53, 940	62, 640	70, 470
	Board feet	*Board feet*	*Board feet*	*Board feet*	*Board feet*	*Board feet*	*Board feet*	*Board feet*	*Board feet*	*Board feet*	*Board feet*
Per capita average use	200	193	213	216	208	224	227	221	232	235	234

[1] Projections based on alternate assumptions about growth in population and economic activity as specified in the introductory section of this chapter.

[2] In addition to new construction includes railroad ties laid as replacements in existing track.

[3] Includes upkeep and improvement of nonresidential buildings and structures; farm construction except housing; mining; made-at-home projects such as furniture, boats, and picnic tables; made-on-the-job products like advertising and display structures; and a wide variety of other miscellaneous products and uses.

The alternative assumptions on population and economic growth discussed in the introductory section of this chapter have substantial impacts on the demand for lumber in all end uses (table 136, fig. 69). As a result, by 2000 projected total demand at 1970 relative prices ranges from 55.5 billion board feet to 70.5 billion board feet.

Projected demand for lumber with alternative price assumptions.—The alternative assumptions on prices specified in the introductory section also have substantial impacts on projections of demand (table 137, fig. 69). Thus, with relative prices rising at 1.5 percent per year, projected demands for lumber (medium level) remain fairly constant over the projection period at about 45 billion board feet.

With prices of softwood lumber 30 percent above the 1970 average, projected demands for lumber in 1980 would be about the same as consumption in 1971. After 1980, however, projected demand under this price assumption rises rapidly to 53 billion board feet in 2000. This would be some 9 billion board feet below the projected level at 1970 relative prices—a measure of the possible loss of market share to competing materials as a result of higher lumber prices.

Lumber exports and imports.—In addition to domestic demand there has been a modest export demand for lumber for many decades (table 137; Append. V, table 15). Lumber exports average around 1.1 billion feet a year in the 1960's, and this level, adjusted slightly for alternative price assumptions, was assumed to continue through the projection period.

Between the late 1940's and the late 1960's softwood lumber imports, nearly all from Canada, rose from less than a billion board feet to nearly 6 billion feet in 1970 and 9 billion board feet in 1972 (table 137). In years of reduced demand for lumber in the United States, Canadian imports have not dropped appreciably while production in U.S. mills has declined.

Findings of recent Canadian studies, summarized in Chapter IV of this study, show that Canada has the resources to support continued expansion of lumber production and shipments to the United States. However, in view of the higher harvesting, manufacturing and transportation costs associated with the development of the available resources, it appears that significant increases in imports could not be attained without a rise in relative prices of softwood lumber, as occurred in 1971 and 1972.

Accordingly, it was estimated that at 1970 relative prices, softwood lumber imports would remain close to the 1970 level. With relative lumber prices 30 percent above those of 1970, and with prices rising at annual rates of 1.5 percent, softwood lumber imports by 2000 were projected to reach 12 and 13 billion board feet, respectively. These estimates are believed to be consistent with projections of softwood lumber production and exports contained in Canadian reports referred to in Chapter IV.

Small volumes of hardwood lumber also have been imported, mainly from Canada and various tropical countries. These imports are projected to range from 0.4 to 0.9 billion board feet by 2000 under the alternative price assumptions.

TABLE 137.—*Lumber consumption, exports, imports, and domestic production, selected years 1920–72, with projections under alternate price assumptions (medium projections of growth in population and economic activity) to 2000*

Year	Domestic consumption				Exports			Imports			Domestic production		
	Total	Per capita	Soft-woods	Hard-woods	Total	Soft-woods[1]	Hard-woods	Total	Soft-woods[1]	Hard-woods	Total	Soft-woods	Hard-woods
	Billion board feet	*Board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*
1920	34.6	325	27.4	7.2	1.7	1.5	0.2	1.4	1.3	(2)	35.0	27.6	7.4
1925	40.2	347	32.8	7.5	2.6	2.2	.4	1.8	1.7	0.1	41.0	33.3	7.7
1930	28.2	229	22.5	5.8	2.4	1.9	.4	1.2	1.2	(2)	29.4	23.2	6.1
1935	22.1	173	17.6	4.5	1.3	1.0	.3	.4	.4	.1	22.9	18.2	4.7
1940	31.0	234	25.4	5.5	1.0	.8	.2	.7	.6	.1	31.2	25.6	5.5
1945	28.8	205	21.7	7.0	.4	.3	.1	1.1	.9	.2	28.1	21.1	7.0
1950	40.9	269	33.4	7.5	.5	.4	.1	3.4	3.1	.3	38.0	30.6	7.4
1955	40.1	242	32.5	7.6	.8	.7	.2	3.6	3.3	.3	37.4	29.8	7.6
1960	36.0	199	29.6	6.4	.9	.7	.2	3.9	3.6	.3	32.9	26.7	6.3
1965	41.1	212	33.4	7.7	.9	.8	.1	5.2	4.9	.3	36.8	29.3	7.5
1966	40.8	207	32.8	8.0	1.0	.9	.2	5.2	4.8	.4	36.6	28.8	7.7
1967	38.8	195	31.1	7.6	1.1	1.0	.2	5.1	4.8	.3	34.7	27.3	7.4
1968	41.5	207	34.0	7.4	1.2	1.0	.1	6.2	5.8	.3	36.5	29.3	7.2
1969	41.0	202	33.2	7.8	1.1	1.0	.1	6.3	5.9	.4	35.8	28.3	7.5
1970	39.5	193	32.1	7.3	1.3	1.2	.1	6.1	5.8	.3	34.7	27.5	7.1
1971 [3]	43.5	210	36.4	7.1	1.1	.9	.2	7.6	7.2	.4	37.0	30.3	6.9
1972 [3]	47.4	227	40.0	7.4	1.5	1.2	.3	9.4	9.0	.4	39.4	32.2	7.2
Projections—1970 relative prices													
Year	Domestic demand				Exports			Imports			Demand on U.S. mills		
1980	51.0	224	41.8	9.2	1.3	1.2	0.1	7.4	7.0	0.4	44.9	36.0	8.9
1990	57.9	227	46.9	11.0	1.3	1.2	.1	7.4	7.0	.4	51.8	41.1	10.7
2000	62.1	221	49.7	12.4	1.3	1.2	.1	7.4	7.0	.4	56.0	43.9	12.1
Projections—rising relative prices [4]													
1980	44.5	195	36.5	8.0	1.3	1.2	.1	10.0	9.5	.5	35.8	28.2	7.6
1990	46.6	183	37.7	8.9	1.3	1.2	.1	12.7	12.0	.7	35.2	26.9	8.3
2000	45.7	163	36.6	9.1	1.3	1.2	.1	13.9	13.0	.9	33.1	24.8	8.3
Projections—relative prices 30 percent above 1970 average [5]													
1980	43.3	190	35.5	7.8	1.3	1.2	.1	11.1	10.5	.6	33.5	26.2	7.3
1990	49.3	193	39.9	9.4	1.3	1.2	.1	12.6	12.0	.6	38.0	29.1	8.9
2000	52.8	188	42.2	10.6	1.3	1.2	.1	12.6	12.0	.6	41.5	31.4	10.1

[1] Includes small volumes of mixed species (not classified as hardwoods or softwoods).
[2] Less than 50 million board feet.
[3] Preliminary Forest Service estimates.
[4] With relative prices rising at an annual rate of 1.5 percent from the 1970 trend level.
[5] This approximates softwood lumber prices in early 1972.

Note: Data may not add to totals because of rounding.

Sources: 1920–71—U.S. Department of Commerce, Bureau of the Census. Production—*Lumber production and mill stocks.* Curr. Ind. Reps. Ser. MA–24T (annual); Exports—*U.S. exports—schedule B commodity and country.* FT 410 (monthly); Imports—*U.S. imports—general consumption, schedule A commodity and country.* FT 135 (monthly).

Projections: U.S. Department of Agriculture, Forest Service.

Demand on U.S. mills for lumber.—Domestic lumber production was 34.7 billion board feet in 1970, and 39.4 billion board feet in 1972—somewhat above the average of 36 billion board feet produced annually over the 1950's and 1960's (table 137; Append. V, table 15).

Given the projections of total U.S. demand, imports and exports discussed above, projected demand for domestic lumber at 1970 relative prices rises to some 56 billion board feet by 2000 (medium projection). With relative prices rising at 1.5 percent per year, demand on U.S. mills in 1980 would be close to the average of the 1950's and 1960's (36 billion board feet), but would fall thereafter to about 33 billion board feet in 2000. Under the third assumptions with relative prices 30 percent above the 1970 average, projected demands for domestically produced lumber would approximate 33.5 billion board feet in 1980 and 41.5 billion board feet in 2000.

Since the early 1900's softwoods have accounted for about 80 percent of the domestic cut. In response to differences in the projected rates of growth in demands in the major end uses, such as residential construction and furniture and pallet manufacture, the proportion of domestic production composed of softwoods, is projected to decline slightly over the projection period, particularly under rising prices which would act to stimulate softwood lumber imports.

Plywood Consumption and Demand

Plywood consumption reached 17.8 billion square feet (⅜-inch basis) in 1970 and 23.5 billion

TABLE 138.—*Plywood consumption, by major end use, species group, and per capita use, 1962 and 1970, with projections (1970 relative prices) to 2000*

[⅜-inch basis]

Item	1962	1970	Low projections [1]			Medium projections [1]			High projections [1]		
			1980	1990	2000	1980	1990	2000	1980	1990	2000
	Million square feet	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*
By end use:											
New housing	4,180	6,330	9,560	10,900	10,680	10,150	11,750	11,990	10,770	12,600	13,910
Residential upkeep and improvements	1,030	2,510	3,060	3,720	4,190	3,100	3,800	4,350	3,130	3,860	4,510
New nonresidential construction	1,280	1,700	2,580	3,260	4,050	2,680	3,530	4,550	2,800	3,800	5,100
Manufacturing	1,870	1,656	2,290	2,950	3,760	2,400	3,220	4,300	2,530	3,570	5,010
All other uses [2]	3,356	5,626	8,080	9,625	10,480	8,470	10,305	11,640	8,885	11,010	13,185
Total use	11,716	17,822	25,570	30,455	33,160	26,800	32,605	36,830	28,115	34,840	41,715
By species group:											
Softwoods	9,311	14,038	19,945	23,755	25,865	20,905	25,430	28,725	21,930	27,175	32,540
Hardwoods	2,404	3,784	5,625	6,700	7,295	5,895	7,175	8,105	6,185	7,665	9,175
Total use	11,716	17,822	25,570	30,455	33,160	26,800	32,605	36,830	28,115	34,840	41,715
	Square feet	*Square feet*	*Square feet*	*Square feet*	*Square feet*	*Square feet*	*Square feet*	*Square feet*	*Square feet*	*Square feet*	*Square feet*
Per capita average use	63	87	113	123	125	118	128	131	121	131	139

[1] Projections based on alternate assumptions about growth in population and economic activity as specified in the introductory section of this chapter.

[2] Includes shipping; upkeep and improvement of nonresidential buildings and structures; farm construction except housing; mining; made-at-home projects such as furniture and boats; made-on-the-job products like advertising and display structures; and a wide variety of other miscellaneous products and uses.

Note: Veneer is included in the estimates for manufacturing and shipping.

square feet in 1972 (tables 138 and 139; fig. 70; Append. V, table 16). Consumption in 1972 was about 6 times the volume consumed in 1950—and the peak in a trend that has been rising at annual rate of 8.5 percent for more than two decades. Per capita consumption in this period also showed a sharp upward trend from around 25 square feet in 1950 to 112 square feet in 1972.

About 36 percent of the plywood consumed in 1970 went into the production of new housing, and 24 percent into other types of construction including residential upkeep and improvements. The remainder was used in manufacturing and other unclassified uses.

Data for the early 1960's indicate that several billion square feet of veneer was also used at that time in the manufacture of products such as furniture and matches and in shipping containers. Although separate estimates of veneer consumption and production are not shown here because of the lack of recent data, these items are included in the estimates of veneer log consumption and production shown later in this chapter.

The rapid rise in plywood consumption in 1950's and early 1960's was caused in large part by widespread substitution of softwood plywood for lumber in sheathing and subflooring in residential construction and in concrete formwork, and by the growing use of hardwood plywood for paneling in residential construction and the manufacture of furniture. Trends in use in the late 1960's and early 1970's and data obtained from studies of wood use in construction suggest that most of the potential substitution of softwood plywood for lumber in construction has taken place.

Projected demand for plywood.—Nonetheless, projected growth in construction and manufacturing is large enough to result in very substantial increases in projected demands for plywood. At 1970 relative prices, the medium projection of demand in 2000 is 36.8 billion square feet (⅜-inch basis)—slightly more than double consumption in 1970. Per capita demand is projected to increase by 1.5 times to 131 square feet.

As in the case of lumber, the alternative assumptions on growth in population and economic activity, and on prices, have substantial impacts on projected demand (tables 138 and 139, fig. 70). For example, if relative prices rise 1 percent per year, projected demand (medium level) in 2000 would be some 20 percent under the projected level assuming 1970 relative prices.

Since the late 1950's softwood plywood has composed about four-fifths of total plywood consumption. An analysis of prospective growth in demand by major end uses indicated that this percentage is likely to remain about the same through the projection period.

Plywood exports and imports.—Softwood plywood exports have been of minor importance, reaching a peak of about 200 million square feet (⅜-inch basis) in the late 1960's (table 139; Append. V, table 16). Although some further modest increases in exports are likely, the volume is not expected to be significant in relation to production or consumption.

Exports of hardwood plywood have amounted to less than 100 million square feet in recent decades. Such exports are also expected to remain small during the projection period.

TABLE 139.—*Plywood consumption, exports, imports, and domestic production, selected years 1950–72, with projections under alternate price assumptions (medium projections of growth in population and economic activity) to 2000*

[⅜-inch basis]

Year	Domestic consumption				Exports			Imports			Domestic production [1]		
	Total	Per capita	Soft-woods	Hard-woods	Total	Soft-woods	Hard-woods [2]	Total	Soft-woods	Hard-woods	Total	Soft-woods	Hard-woods
	Billion square feet	*Square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*
1950	------	------	2.7	------	(3)	(3)	(3)	(3)	(3)	(3)	------	2.7	------
1955	7.1	43	5.3	1.8	(3)	(3)	(3)	(3)	(3)	(3)	6.6	5.3	1.4
1960	9.6	53	7.8	1.8	(3)	(3)	(3)	0.7	(3)	0.7	8.9	7.8	1.1
1965	15.5	80	12.4	3.1	(3)	(3)	(3)	1.1	(3)	1.0	14.5	12.4	2.0
1966	16.1	82	12.8	3.3	0.1	(3)	(3)	1.3	(3)	1.3	14.9	12.8	2.1
1967	15.9	80	12.8	3.2	.1	0.1	(3)	1.2	(3)	1.2	14.8	12.8	1.9
1968	18.2	91	14.3	3.9	.1	.1	(3)	1.9	(3)	1.9	16.4	14.4	2.0
1969	17.3	85	13.4	4.0	.2	.2	(3)	2.1	(3)	2.1	15.4	13.5	1.9
1970	17.8	87	14.0	3.8	.2	.1	0.1	2.0	(3)	2.0	15.9	14.1	1.8
1971 [4]	20.7	100	16.3	4.5	.1	.1	(3)	2.5	(3)	2.5	18.3	16.4	1.9
1972 [4]	23.5	112	18.1	5.4	.2	.2	(3)	3.2	(3)	3.2	20.5	18.3	2.2

Projections—1970 relative prices

Year	Domestic demand				Exports			Imports			Demand on U.S. mills		
1980	26.8	118	20.9	5.9	(3)	(3)	(3)	3.5	(3)	3.5	23.3	20.9	2.4
1990	32.6	128	25.4	7.2	(3)	(3)	(3)	3.5	(3)	3.5	29.1	25.4	3.7
2000	36.8	131	28.7	8.1	(3)	(3)	(3)	3.5	(3)	3.5	33.3	28.7	4.6

Projections—rising relative prices [5]

1980	23.9	105	18.6	5.3	(3)	(3)	(3)	3.3	(3)	3.3	20.6	18.6	2.0
1990	27.6	108	21.5	6.1	(3)	(3)	(3)	3.9	(3)	3.9	23.7	21.5	2.2
2000	29.5	105	23.0	6.5	(3)	(3)	(3)	4.2	(3)	4.2	25.3	23.0	2.3

Projections—relative prices 30 percent above 1970 average [6]

1980	22.8	100	17.8	5.0	(3)	(3)	(3)	4.1	(3)	4.1	18.7	17.8	0.9
1990	27.7	109	21.6	6.1	(3)	(3)	(3)	4.2	(3)	4.2	23.5	21.6	1.9
2000	31.3	111	24.4	6.9	(3)	(3)	(3)	4.3	(3)	4.3	27.0	24.4	2.6

[1] Includes production from both domestic and imported species.

[2] Includes mixed species (not classified as hardwoods and softwoods).

[3] Less than 50 million square feet in the years 1950–72 and 500 million square feet in 1980, 1990, and 2000.

[4] Preliminary.

[5] With relative prices rising at an annual rate of 1.0 percent from the 1970 trend level.

[6] This approximates prices of softwood plywood in early 1972.

Note: Data may not add to totals because of rounding.

Sources: 1950–72—U.S. Department of Commerce, Bureau of the Census. Production—*Softwood plywood.* Curr. Ind. Reps. Ser. MA24H (annual); *Hardwood plywood.* Curr. Ind. Reps. Ser. MA24H (annual); Exports—*U.S. exports—schedule B commodity and country.* FT 410 (monthly); Imports—*U.S. imports—general and consumption, schedule A commodity and country.* FT 135 (monthly).

Projections: U.S. Department of Agriculture, Forest Service.

Veneer exports (not included in table 139) in 1972 totaled 492 million square feet (surface measure) roughly eight times the volume shipped in the early 1960's. Despite this increase veneer exports are not expected to become a significant source of demand for domestically produced veneer logs.

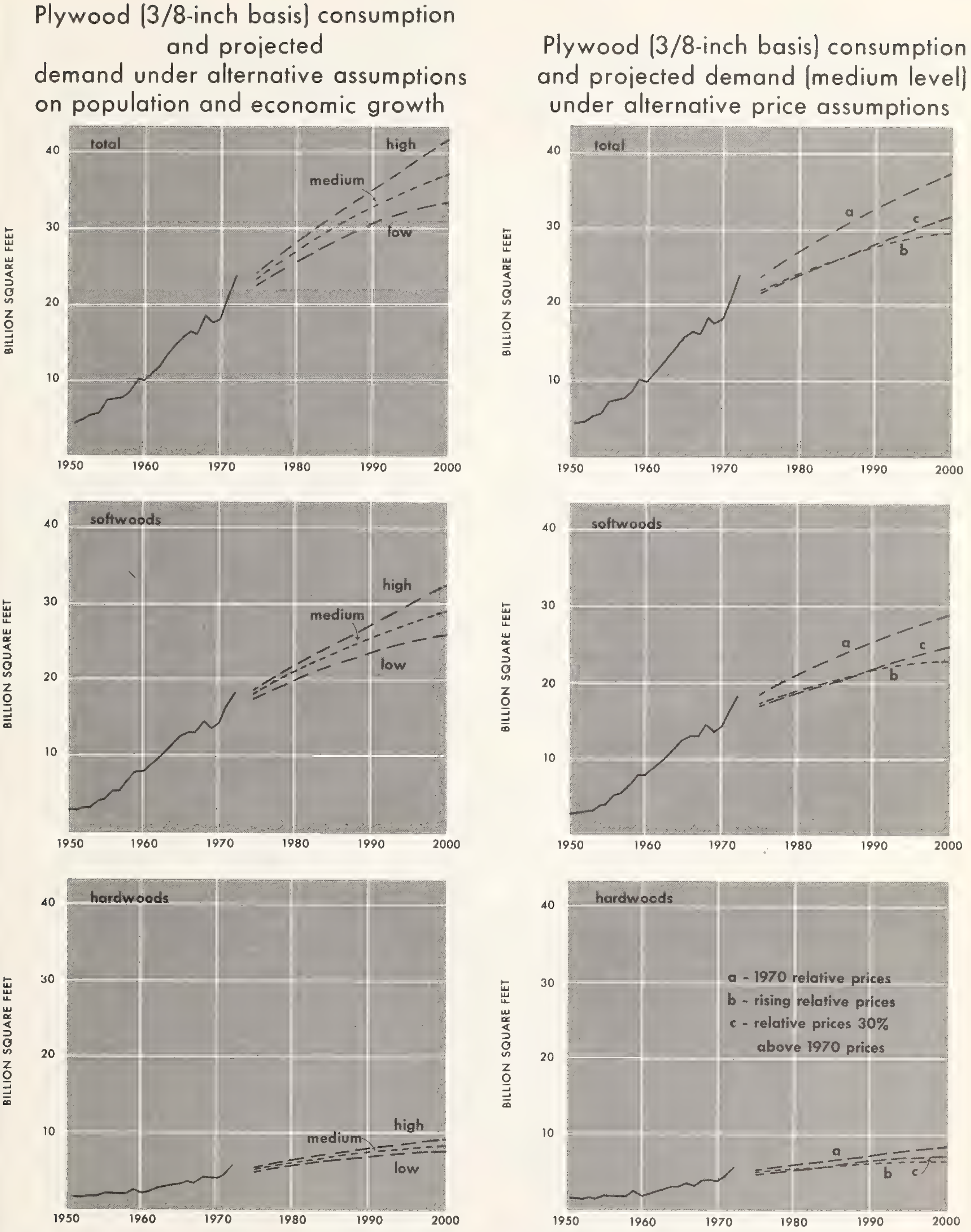
In contrast to limited exports, imports of hardwood plywood have risen rapidly in the last two decades to a total of 3.2 billion square feet (⅜-inch basis) in 1972 (table 139). Imports of softwood plywood, on the other hand, have not been significant and no change is assumed in the next few decades.

Over four-fifths of all plywood imports in 1972 were composed of lauan from the forests of insular Southeast Asia. Most of the remainder consisted of other tropical species such as sen, mahogany, and shiva.

Assuming 1970 relative prices, hardwood plywood imports have been projected to rise to 3.5 billion square feet by 1980 and remain at this level through the rest of the projection period. Under the alternative higher price assumptions, plywood imports are projected to go as high as 4.3 billion square feet by 2000.

Veneer imports have also increased rapidly, moving up from around 400 million square feet (surface measure) in the early 1950's to 3.2 billion square feet in 1972. Hardwood veneer imports are expected to continue to rise for use in domestic production of plywood.

Demand on U.S. mills for plywood.—Domestic plywood production in 1972 reached 20.5 billion square feet (⅜-inch basis)—more than 4 times the level of output in the early 1950's (table 139). Softwoods accounted for nearly all of the growth in this period.



Plywood (3/8-inch basis) consumption and projected demand under alternative assumptions on population and economic growth

Plywood (3/8-inch basis) consumption and projected demand (medium level) under alternative price assumptions

Figure 70

Projected demand for plywood produced by domestic industries show continued and rapid growth under all price assumptions. By 2000 projected demands range from 25.3 billion square feet (with prices rising at 1 percent per year) to 33.3 billion square feet (at 1970 relative prices). Most of the projected increases are for softwood plywood.

Building Board Consumption and Demand

Building board consumption including insulation board, hardboard, and particleboard reached 14.1 billion square feet (⅜-inch basis) in 1972—over 4 times the volume consumed in 1950 (tables 140 and 141). Per capita consumption more than tripled in this period, rising from 22 to 68 square feet.

In the 1950's and 1960's particleboard consumption showed the largest increase, rising from less than 50 million square feet in 1950 to 6.3 billion square feet in 1972—an average annual rate of about 25 percent. Hardboard use also rose rapidly, with an average annual increase of 9.5 percent. Although use of insulation board has been relatively stable, this product still accounted for 40 percent of all building board consumed in 1972.

The fast growth in use of particleboard largely reflects the substitution of this product for lumber and plywood used as core stock in the manufacture of furniture, doors, and cabinets. Much of the growth in use since the late 1950's reflects similar substitution for floor underlayment. Present work on the development of structural grades of particleboard also suggests the likelihood of further substitution for softwood plywood used as subflooring and roof sheathing in construction.

Much of the recent increase in the use of hardboard also reflects substitution for lumber and plywood, especially in the furniture industry. Use of insulation board, on the other hand, has been closely related to construction activity.

Projected demand for building board.—Projections of demand for building board (medium level) at 1970 relative prices reach 28 billion square feet (⅜-inch basis) by 2000—some 3 times the volume consumed in 1970 (table 140). Projected per capita demand roughly doubles rising from 47 to 100 square feet. Particleboard and hardboard are expected to show the largest increases as in recent years.

The alternative assumptions on growth in population and economic activity have substantial impacts with projected total demands in 2000 ranging from about 25 to 32 billion square feet (table 140). Alternative assumptions on prices, on the other hand, have relatively little effect, largely because of the small size of the assumed price increases and the assumed inelasticity of demand (table 141).

Demand on U.S. mills for building board.—Exports and imports of building board have been relatively small, and this situation is expected to continue through the projection period. By far the largest part of projected demands will thus have to be supplied by U.S. industries from domestic timber resources. A substantial part of this demand for wood is expected to be supplied by plant residues.

Meeting the medium projection of demand in 2000, at all assumed price levels, would involve more than doubling the size of the particleboard and hardboard industries and expanding the insu-

TABLE 140.—*Building board consumption, by major end use, type of board, and per capita use, 1970, with projections (1970 relative prices) to 2000*

[⅜-inch basis]

Item	1970	Low projection [1]			Medium projection [1]			High projection [1]		
		1980	1990	2000	1980	1990	2000	1980	1990	2000
	Million square feet	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*
By end use:										
New housing	2,760	4,225	5,065	5,305	4,480	5,440	5,920	4,730	5,825	6,840
Residential upkeep and improvements	1,415	1,815	2,295	2,760	1,825	2,345	2,855	1,855	2,385	2,960
New nonresidential construction	960	1,375	1,705	1,890	1,440	1,840	2,130	1,495	1,985	2,385
Manufacturing	1,790	3,375	5,215	7,590	3,545	5,715	8,695	3,750	6,360	10,165
All other uses [2]	2,683	4,615	6,125	7,520	4,840	6,575	8,400	5,065	7,100	9,575
Total	9,608	15,405	20,405	25,065	16,130	21,915	28,000	16,895	23,655	31,925
By type of board:										
Insulation board	4,552	4,975	5,690	7,110	5,330	6,040	7,820	5,690	6,755	8,530
Hardboard	1,541	2,475	3,430	4,380	2,570	3,905	5,430	2,760	4,570	7,145
Particleboard	3,515	7,955	11,285	13,575	8,230	11,970	14,750	8,445	12,330	16,250
Total use	9,608	15,405	20,405	25,065	16,130	21,915	28,000	16,895	23,655	31,925
	Square feet	*Square feet*	*Square feet*	*Square feet*	*Square feet*	*Square feet*	*Square feet*	*Square feet*	*Square feet*	*Square feet*
Per capita average use	47	68	82	94	71	86	100	73	89	106

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[1] Projections based on alternate assumptions about growth in population and economic activity as specified in the introductory section of this chapter.

[2] Includes upkeep and improvement of nonresidential buildings and structures; shipping; farm structures, except housing; mining; made-at-home projects such as furniture; made-on-the-job products like advertising and display structures; and a wide variety of other miscellaneous products and uses.

TABLE 141.—*Building board consumption, exports, imports, and domestic production, selected years, 1950–72, with projections under alternate price assumptions (medium projections of growth in population and economic activity) to 2000*

[⅜-inch basis]

Year	Domestic consumption					Exports				Imports				Domestic production			
	Total building board	Per capita	Insulation board	Hardboard	Particleboard	Total building board	Insulation board	Hardboard	Particleboard	Total building board	Insulation board	Hardboard	Particleboard	Total building board	Insulation board	Hardboard	Particleboard
	Billion square feet	*Square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*
1950	3.4	22	3.0	0.3	(1)	0.1	0.1	(1)	(1)	(1)	(1)	(1)	(1)	3.4	3.1	0.3	(1)
1955	4.6	28	3.9	.5	0.1	.1	.1	(1)	(1)	0.1	(1)	0.1	(1)	4.6	4.0	.5	0.1
1960	5.1	28	3.8	.7	.5	.1	.1	(1)	(1)	.1	(1)	.1	(1)	5.0	3.8	.6	.5
1965	7.3	38	4.5	1.2	1.6	.1	.1	(1)	(1)	.3	0.1	.2	(1)	7.1	4.5	1.0	1.6
1966	7.3	37	4.1	1.2	2.0	.1	.1	(1)	(1)	.2	.1	.2	(1)	7.1	4.1	1.0	2.0
1967	7.7	39	4.3	1.1	2.2	.1	.1	(1)	(1)	.2	.1	.2	(1)	7.5	4.3	1.0	2.2
1968	9.0	45	4.7	1.4	2.8	.1	.1	(1)	(1)	.3	.1	.2	(1)	8.7	4.6	1.2	2.8
1969	9.9	49	4.9	1.6	3.4	.1	.1	(1)	(1)	.4	.1	.2	(1)	9.7	4.8	1.4	3.4
1970	9.6	47	4.6	1.5	3.5	.1	.1	(1)	(1)	.3	.1	.1	(1)	9.2	4.3	1.4	3.5
1971 [2]	11.7	56	4.9	1.9	4.9	.2	.1	(1)	(1)	.4	.1	.2	(1)	11.8	5.1	1.7	4.9
1972 [2]	14.1	68	5.5	2.2	6.3	.2	.1	(1)	.1	.5	.1	.4	(1)	13.8	5.5	1.9	6.4
Projections—1970 relative prices																	
Year	Domestic demand					Exports				Imports				Demand on U.S. mills			
1980	16.1	71	5.3	2.6	8.2	0.2	0.1	0.1	0.1	0.5	0.2	0.2	(1)	15.9	5.3	2.4	8.3
1990	21.9	86	6.0	3.9	12.0	.3	.1	.1	.1	.6	.2	.3	0.1	21.7	5.9	3.7	12.0
2000	28.0	100	7.8	5.4	14.8	.4	.1	.1	.1	.6	.2	.3	.1	27.7	7.7	5.2	14.8
Projections—rising relative prices [3]																	
1980	16.0	70	5.3	2.5	8.2	.2	.1	.1	.1	.5	.2	.2	.1	15.7	5.2	2.4	8.2
1990	21.4	84	5.9	3.8	11.7	.2	.1	.1	.1	.9	.3	.4	.2	20.7	5.7	3.5	11.6
2000	26.9	96	7.5	5.2	14.2	.2	(1)	.1	.1	1.0	.3	.4	.3	26.1	7.2	4.9	14.0
Projections—relative prices 10 percent above 1970 averages																	
1980	15.7	69	5.2	2.5	8.0	.1	(1)	(1)	.1	.8	.3	.3	.2	15.0	4.9	2.2	7.9
1990	21.3	83	5.9	3.8	11.6	.2	.1	.1	.1	.9	.3	.4	.2	20.6	5.7	3.5	11.5
2000	27.2	97	7.6	5.3	14.3	.2	.1	.1	.1	1.0	.3	.4	.3	26.4	7.4	5.0	14.1

[1] Less than 50 million square feet.

[2] Preliminary.

[3] Relative prices rising 0.5 percent per year from 1970 trend levels.

Note: Data may not add to totals because of rounding.

Sources: 1950–72—U.S. Department of Commerce, Bureau of the Census. Production—*Insulating board and hardboard.* Curr. Ind. Reps., Ser.: M-26 A (annual); *Particleboard.* Curr. Ind. Reps., Ser.: 24 (L) (annual); Exports—U.S. Department of Agriculture, Forest Service estimates based on *U.S. exports of domestic merchandise.* Rep. FT 610; Imports—U.S. Department of Agriculture, Forest Service estimates based on *U.S. Imports for consumption and general imports.* Rep. FT 210.

Projections: U.S. Department of Agriculture, Forest Service.

lation board industry about 50 percent. Projected demands for wood for such production are included with pulpwood for hardboard and insulation board, and with miscellaneous timber products for particleboard.

DEMAND FOR PULPWOOD

Since 1920 pulpwood consumption in United States mills has increased 12 times, rising to 5.6 billion cubic feet in 1972 [34] (72.4 million cords). Export demand, including the pulpwood equivalent of pulp and paper, increased nineteenfold to 0.7 billion cubic feet (9.5 million cords). As a result of such growth, nearly half of the cubic volume of timber harvested from domestic forests is used as pulpwood.

Demand for pulpwood is a derived demand in the sense that it is determined by demands for paper, board, and other pulp products. The analysis below consequently first considers trends in the use of these end products. Demands for paper and board are then converted to requirements for woodpulp, wastepaper, and other fibers. Projected demands for woodpulp are, in turn, converted to requirements for pulpwood.

Demand for Paper and Board

Consumption of paper and board increased from about 8 million tons in 1920 to 64 million tons in 1972 (table 142; fig. 71; Append. V, table 17). Annual rates of growth calculated from trend values, averaged 4.8 percent in the years 1920–40 then fell to 4.1 percent in the 1950–70 period.

Per capita consumption of paper and board increased about 4 times in the 1920–72 period, rising from 145 to 616 pounds (table 143, fig. 71). Rates of growth in per capita use also showed a substantial decline falling from an average of 3.7 percent annually in the pre-World War II decades to 2.6 percent in the postwar decades.

Factors affecting consumption.—Part of the growth in paper and board consumption in past decades can be attributed to increases in population, economic activity, and disposable personal income. Part of the growth is the result of major displacement of other materials such as lumber, veneer, cooperage, and metals in such products as shipping containers. Development of large markets for new products such as food board, milk cartons, and computer paper also has contributed to increases in consumption.

Paper and board consumption, 1920-71, with projections to 2000

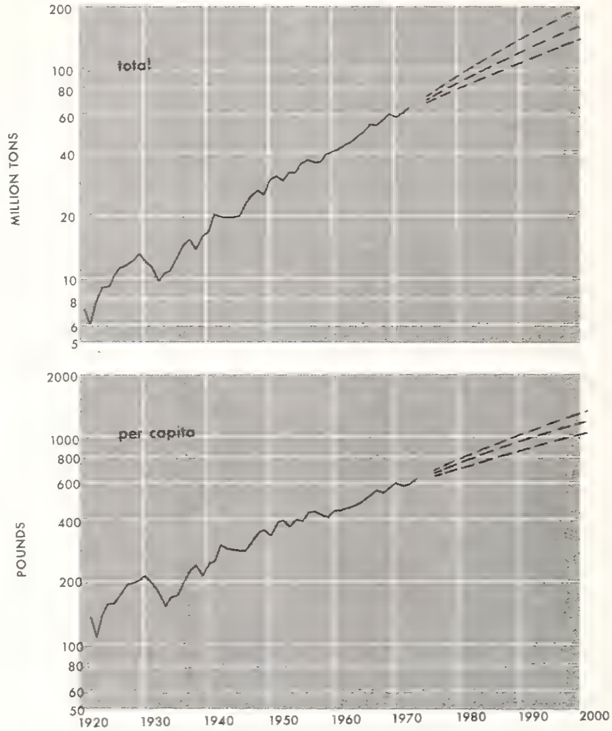

Figure 71

The declining rate of growth in consumption, on the other hand, is partly due to the fact that per capita use of some grades of paper and board is beginning to level off as it moves toward a saturation level.[35] It also reflects stronger competition from materials that compete with paper and board. Use of plastics for packaging foods and many other products, for example, has cut into the demand for several grades of paper and board. Products such as synthetic writing and printing paper now under development also may affect demands in the future.

In projecting demands for paper and board, however, it seems likely that ultimate scarcities and rising prices of raw materials such as petroleum, together with environmental factors relating to manufacturing pollution, and problems of

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[34] This included 3.7 billion cubic feet of roundwood used directly in pulping and 1.9 billion cubic feet of chips and sawdust obtained from slabs, edgings, veneer cores, and other residues of primary manufacturing plants.

[35] For a more complete discussion of the tendency of per capita consumption to approach a saturation value see:

U.S. Department of Agriculture, Forest Service. Use of regression equations for projecting trends in demand for paper and board. U.S. Dept. Agr. Forest Resource Rep. 18, 178 p. 1967.

United Nations Food and Agriculture Organization. World demand for paper to 1975. 1959 p. Rome. 1960.

United Nations Food and Agriculture Organization. Pulp and paper prospects in western Europe. 456 p. Rome. 1963.

TABLE 142.—*Paper and board consumption, selected years 1920–72, with projections of demand (1970 relative prices) to 2000* [1]

Year	Total paper and and board		Paper		Paperboard [2]		Building board	
	Total	Annual rate of change [3]	Total	Annual rate of change [3]	Total	Annual rate of change [3]	Total	Annual rate of change [3]
	Million tons	*Percent*	*Million tons*	*Percent*	*Million tons*	*Percent*	*Million tons*	*Percent*
1920	7.7	----------	5.4	----------	2.3	----------	----------	----------
1925	10.4	6.2	7.1	5.6	3.2	6.8	0.1	----------
1930	12.3	3.4	8.4	3.4	3.8	3.5	.1	----------
1935	12.8	.8	8.2	−.5	4.5	3.4	.1	----------
1940	16.8	5.6	10.6	5.3	6.0	5.9	.2	14.9
1945	19.8	3.3	11.0	.7	7.9	5.7	.9	35.0
1950	29.1	8.0	16.8	8.8	11.0	6.8	1.2	5.9
1955	35.0	3.8	19.4	2.9	13.9	4.8	1.7	7.2
1960	39.3	2.3	22.1	2.6	15.4	2.1	1.9	2.2
1965	49.2	4.6	26.8	3.9	19.9	5.3	2.6	6.5
1966	52.8	7.3	28.9	7.8	21.5	8.0	2.4	−7.7
1967	52.0	−1.5	28.8	−.3	20.8	−3.3	2.4	----------
1968	55.8	7.3	30.2	4.9	22.8	9.6	2.8	16.7
1969	59.0	5.7	31.8	5.3	24.2	6.1	3.0	7.1
1970 [4]	58.1	−1.5	31.7	−.3	23.5	−2.9	2.8	−6.7
1971 [4]	59.7	2.8	32.4	2.2	23.9	1.7	3.4	21.4
1972 [4]	64.3	7.7	34.1	5.2	26.4	10.5	3.8	11.8
Low projections								
1980	78.2	2.9	41.0	2.5	33.2	3.3	4.0	2.8
1990	102.5	2.7	52.2	2.4	45.1	3.1	5.2	2.6
2000	130.4	2.4	64.4	2.1	59.4	2.8	6.6	2.4
Medium projections								
1980	83.1	3.5	43.4	3.1	35.5	4.0	4.2	3.5
1990	116.1	3.4	59.2	3.2	51.1	3.7	5.8	3.3
2000	156.5	3.0	78.0	2.8	70.7	3.3	7.9	3.1
High projections								
1980	89.0	4.2	46.5	3.8	38.0	4.7	4.5	4.2
1990	132.7	4.1	67.6	3.8	58.4	4.4	6.7	4.0
2000	190.2	3.7	94.1	3.4	86.4	4.0	9.7	3.8

[1] Projections based on alternative assumptions about growth in population and economic activity as specified in the introductory section of this chapter.

[2] Includes wet machine board.

[3] The average annual rate of change for 5-year periods ending in the specified years except for the years 1965–72 when annual changes are shown.

[4] Preliminary.

Note: Data may not add to totals because of rounding.

Sources: American Paper Institute. *The statistics of paper.* (Annual, 1960 ed. and 1972 sup.), and *Monthly statistical summary.* New York; U.S. Department of Commerce, Bureau of the Census. *Pulp, paper and board.* Cur. Indus. Reps. Ser. M26A. (annual); U.S. Department of Commerce, Bureau of Domestic Commerce. *Pulp, paper and board.* Quart. Indus. Rep.; and U.S. Department of Agriculture, Forest Service.

Projections: U.S. Department of Agriculture, Forest Service.

TABLE 143.—*Paper and board per capita consumption, selected years 1920–72, with projections of demand (1970 relative prices) to 2000* [1]

Year	Total paper and and board		Paper		Paperboard [2]		Building board	
	Total	Annual rate of change [3]	Total	Annual rate of change [3]	Total	Annual rate of change [3]	Total	Annual rate of change [3]
	Pounds	*Percent*	*Pounds*	*Percent*	*Pounds*	*Percent*	*Pounds*	*Percent*
1920	145	---	102	---	43	---	---	---
1925	180	4.4	123	3.8	56	5.4	1	---
1930	201	2.2	137	2.2	62	2.1	2	14.9
1935	201	---	129	−1.2	71	2.7	1	−12.9
1940	254	4.8	161	4.5	91	5.1	2	14.9
1945	283	2.2	157	−2.4	113	4.4	13	45.4
1950	382	6.2	221	7.1	145	5.1	16	4.2
1955	422	2.0	234	1.1	167	2.9	20	4.6
1960	435	.6	244	.8	170	.4	21	1.0
1965	507	3.1	276	2.4	205	3.7	26	4.4
1966	537	5.9	294	6.5	219	6.8	24	−7.7
1967	523	−2.6	290	−1.4	210	−4.1	24	---
1968	556	6.3	301	3.8	227	8.1	28	16.7
1969	582	4.7	314	4.3	239	5.3	30	7.1
1970 [4]	567	−2.6	309	−1.6	229	−4.2	27	−10.0
1971 [4]	577	1.8	313	1.3	231	.9	33	22.2
1972 [4]	616	6.8	327	4.5	253	9.5	36	9.1
Low projections								
1980	692	1.9	363	1.6	294	2.3	35	1.6
1990	827	1.8	421	1.5	364	2.2	42	1.8
2000	981	1.7	484	1.4	447	2.1	50	1.8
Medium projections								
1980	729	2.4	381	2.1	311	2.8	37	2.1
1990	910	2.2	464	2.0	401	2.6	45	2.0
2000	1,114	2.0	555	1.8	503	2.3	56	2.2
High projections								
1980	768	2.9	401	2.6	328	3.4	39	2.7
1990	997	2.6	508	2.4	439	3.0	50	2.5
2000	1,263	2.4	625	2.1	574	2.7	64	2.5

[1] Projections based on alternative assumptions about growth in population and economic activity as specified in the introductory section of this chapter.

[2] Includes wet machine board.

[3] The average annual rate of change for 5-year periods ending in the specified years except for the years 1965–72 when annual changes are shown.

[4] Preliminary.

Note: Data may not add to totals because of rounding.

Sources: See source note, table 142.

disposal of nonbiodegradable products,[36] will tend to limit inroads of competitive materials in most markets for paper and board. This appears especially likely over the range in which the prices of paper and board can reasonably be expected to increase in the next two or three decades.

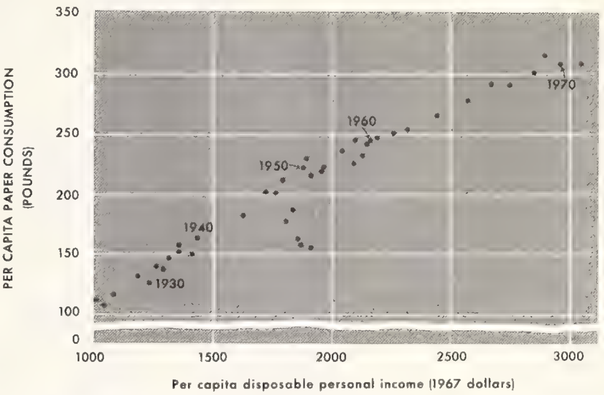
While substitution may be limited in the projection period, it nonetheless seems likely that the rate of growth in consumption, and especially per capita consumption, will continue to decline as consumption approaches some maximum or saturation level for different products and uses.

Relationships between paper and board consumption and economic variables.—In the past there have been large differences in rates of growth in consumption of the major grades of paper and board. These have resulted from the development of new pulp-based products, inroads of substitutes, varying rates of growth in major sectors of the economy, and other factors such as changes in consumer tastes.

In partial recognition of these differences the various types and grades of paper and board have been grouped into three categories—paper, paperboard, and building board (insulation board and hardboard)—which have a common relationship to one or more of the basic determinants of demand discussed in the introductory section of this chapter (see Append. V, tables 18–20 for historical statistics for these categories).[37]

Because most paper is consumed in one form or another by individuals, with the level of use a function of income, there has been a close statistical relationship between changes in per capita consumption of paper and changes in per capita disposable personal income[38] (fig. 72). In the case of paperboard, which is used primarily for packaging industrial and agricultural commodities, per capita consumption has shown a close relationship to changes in the per capita gross national product. Most of the growth in the consumption of building board (insulation board and hardboard), which is used in construction for such purposes as sheathing and underlayment and in manufacturing, has been associated with changes in these sectors of the economy.

Relationship between per capita paper consumption and per capita disposable personal income, 1929-70



Relationship between per capita paper board consumption and per capita gross national product, 1920-70

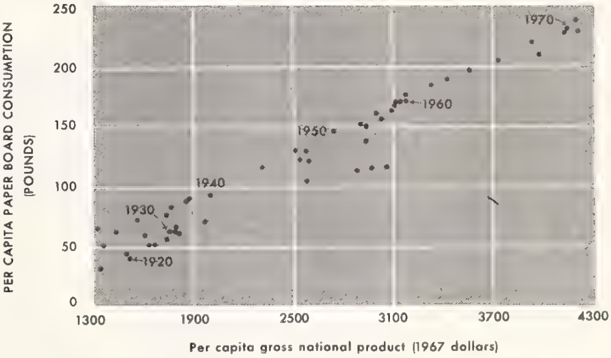


Figure 72

Projected demands for paper and board.—On the basis of past relationships and trends in use, total demand for paper and board at 1970 relative prices is projected to rise to 83 million tons (medium level) in 1980, and to 157 million tons in 2000—some 2.7 times consumption in 1970 (table 142, fig. 71). Projections of per capita demand also rise rapidly, reaching 729 pounds in 1980 and 1,114 pounds in 2000 (table 143, fig. 71).

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[36] For a more complete discussion of the problems associated with the development and use of plastics in place of paper and board see:

Copelman, Serge, and Guy Jacqueline. Synthetic paper: Japan leads the way in technological development. Pulp and Paper 45(5):111–115.

United Nations Food and Agriculture Organization. Note on substitution by and for paper and paperboard. FO:PAP/DST/71/1.3 of the Second Consultation on World Pulp and Paper Demand, Supply and Trade. 1971.

United Nations Food and Agriculture Organization. Present status of development of synthetic paper in Japan. FP/PAP/DST/1.9 of the Second Consultation on World Pulp and Paper Demand, Supply and Trade. 1971.

[37] In previous Forest Service reports presenting estimates of demand for paper and board, as in *Use of regression equations for projecting trends in demand for paper and board,* Op. cit., separate projections were made for a number of major types of paper and board, such as newsprint, printing papers, packaging papers, container board, etc. Such detailed projections are not presented in this study because of difficulties in developing statistical series as a result of extensive changes made in 1967 in the definitions and classifications of various grades of paper and board, and lack of recent information on the kinds of fibrous materials used in the furnish of different types of paper and board.

[38] The choice of independent variable, base time period, units of measurement, form of equation, and kind of equation used in this analysis for projecting demands for paper and paperboard were based on guides developed in the study *Use of regression equations for projecting trends in demand for paper and board,* Op. cit.

As indicated in the following tabulation, the medium projections of demand for paper and board in 1980 are close to projections shown in a preceding Forest Service study [39] and to those developed by Slatin of the American Paper Institute [40] and the Midwest Research Institute.[41]

	Total (million tons)			*Per capita (pounds)*		
	Paper and board	*Paper*	*Board*	*Paper and board*	*Paper*	*Board*
This study	83	43	40	729	381	348
Preceding FS study	86	44	42	728	376	352
API study	87	45	42			
MRI study	83	42	41			

Annual rates of growth in both total and per capita demands for paper and board show substantial declines over the projection period. That for per capita demand, for example, falls from an average of 2.4 percent in the 1960's to 2.0 percent in the 1990's.

Effects of the alternative assumptions on growth in population and gross national product are substantial, with projected total demand for paper and board ranging from 130 million tons to 190 million tons in 2000 (table 143). These projections would, of course, be somewhat lower with higher prices, as indicated in the tabulation below showing the medium projections of demand under alternative price assumptions.

Year	*Total (million tons)*	*Paper (million tons)*	*Board (million tons)*
	Projections—1970 relative prices		
1980	83. 1	43. 4	39. 7
1990	116. 1	59. 2	56. 9
2000	156. 6	78. 0	78. 6
	Projections—relative prices rising 0.5 percent per year		
1980	82. 6	43. 1	39. 5
1990	114. 3	58. 3	56. 0
2000	152. 5	76. 0	76. 5
	Projections—relative prices 10 percent above 1970 average		
1980	81. 4	42. 5	38. 9
1990	113. 8	58. 0	55. 8
2000	153. 5	76. 5	77. 0

With inelastic demand, as assumed in the introductory section, projections would be lowered appreciably only with very large increases in relative prices.

Exports of paper and board.—Exports of paper and board have been small in relation to U.S. consumption, but have risen rapidly in recent years to a 1972 total of 3 million tons (table 144;

TABLE 144.—*Paper and board consumption, exports, imports, and domestic production, selected years 1920–72, with projections* [1] *(1970 relative prices) to 2000* [2]

[Million tons]

Year	Apparent consumption	Exports	Imports	Domestic production
1920	7. 7	0. 2	0. 8	7. 2
1925	10. 4	. 1	1. 5	9. 0
1930	12. 3	. 2	2. 3	10. 2
1935	12. 8	. 1	2. 4	10. 5
1940	16. 8	. 5	2. 8	14. 5
1945	19. 8	. 4	2. 8	17. 4
1950	29. 1	. 3	5. 0	24. 4
1955	35. 0	. 7	5. 5	30. 2
1960	39. 3	. 9	5. 7	34. 4
1965	49. 2	1. 6	6. 8	44. 1
1966	52. 8	1. 8	7. 5	47. 1
1967	52. 0	2. 0	7. 1	46. 9
1968	55. 8	2. 5	7. 0	51. 2
1969	59. 0	2. 6	7. 4	54. 2
1970	58. 1	2. 7	7. 2	53. 5
1971	59. 7	3. 0	7. 6	55. 1
1972 [3]	64. 3	3. 0	7. 9	59. 3

Year	Domestic demand	Exports	Imports	Demand on U.S. mills
	Low projections			
1980	78. 2	3. 5	8. 0	73. 7
1990	102. 5	3. 5	8. 0	98. 0
2000	130. 4	3. 5	8. 0	125. 9
	Medium projections			
1980	83. 1	3. 5	8. 0	78. 6
1990	116. 1	3. 5	8. 0	111. 6
2000	156. 6	3. 5	8. 0	152. 1
	High projections			
1980	89. 0	3. 5	8. 0	84. 5
1990	132. 7	3. 5	8. 0	128. 2
2000	190. 2	3. 5	8. 0	185. 7

[1] Projections based on alternative assumptions about growth in population and economic activity as specified in the introductory section of this chapter.

[2] Data may not add to totals because of rounding.

[3] Preliminary.

Sources: See source note, table 142.

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[39] U.S. Department of Agriculture, Forest Service. Use of regession equations for projecting trends in demand for paper and board. Op. cit.

[40] Slatin, Benjamin. Timber requirements of the paper industry in the seventies and eighties. American Paper Institute. New York. 1971.

[41] Midwest Research Institute. Paper recycling the art of the possible 1970–1985. Kansas City. 1973.

Append. V, tables 17–20). Exports of nearly all grades of paper and board have shown some increase, but kraft linerboard has accounted for by far the largest part of the recent growth.

Exports of paper and board have moved to all regions of the world (Append. V, table 21). However, in 1971 about 44 percent of the total went to Western Europe and another 23 percent to Latin America. Nearly all of the remainder was shipped to Japan, Canada, and Africa. Most of the growth in exports in the 1960's was to Western Europe and Latin America.

A recent study by the Food and Agriculture Organization of the United Nations indicates that world demands for paper and board are likely to continue to grow rapidly, as indicated in the tabulation below:[42]

	Consumption in 1969 (million tons)	*Projected demand*		
		1975 (million tons)	*1980 (million tons)*	*1985 (million tons)*
Western Europe	35.0	49.4	63.0	81.4
Japan	12.3	22.7	33.5	45.0
Latin America	5.0	7.5	10.6	14.4
Eastern Europe and USSR	11.8	17.1	22.5	32.3
All other (except North America)	11.0	15.9	22.4	30.5
Total	75.1	112.6	152.0	203.6

This, and other similar studies, conclude that forest resources in western Europe and Japan are not large enough to supply prospective demands for timber products.[43] (For a more detailed discussion of the timber demand and supply situation in western Europe and Japan see Chapter IV.) This means that more and more of the rapidly growing demands for paper and board in these countries must be supplied from timber resources in other parts of the world.

In view of the prospective demand and resource situation in the major importing areas it appears likely that export demands for paper and board produced in the United States will continue to increase in the years immediately ahead. However, the United States is faced with a tightening timber supply situation (see Chapter VI) and consequently exports have been assumed to level off at 3.5 million tons a year.

Developments in other parts of the world could also change the outlook. For example, it may be technically and economically feasible to use increasing quantities of pulp made from tropical hardwoods, fast growing plantation species, or nonwood fibers. These sources of fiber could support large increases in pulp production in Latin America, Africa, and the Far East, and expanded paper and board production in western Europe and Japan. Also development of the enormous softwood resources in the USSR could add to world supplies of market pulp.

Imports of paper and board.—U.S. imports of paper and board have been substantially larger than exports and have increased fairly steadily to a level of 7.9 million tons in 1972 (table 144; Append. V, tables 17–20).

Newsprint has composed 70 percent or more of the imports since before 1920. However, in recent years some other grades, especially building board, have increased in relative importance. Canada provided about 95 percent of the imports of newsprint in 1971 and most other grades as well (Append. V, table 22).

Although imports have increased somewhat in the last few years, it appears unlikely that Canada could significantly increase recent levels of shipments to the United States unless prices rise enough to cover the higher costs of utilizing timber in the undeveloped northern parts of the Canadian provinces (see discussion Chapter IV). Thus, it was assumed that at 1970 relative prices imports of paper and board would remain at about the 1972 level. With higher prices Canada could provide much larger volumes of paper and board, with actual imports depending in part on U.S. demand.

In the 1947–70 period there was a close statistical relationship between paper and board imports and domestic consumption. Projections (medium level) based on this relationship, and the rising price assumption, rise to 13.5 million tons by 2000—some 5.6 million tons above the 1972 volume as shown in the following tabulation.

Year	*Total demand (million tons)*	*Exports (million tons)*	*Imports (million tons)*	*Demand on U.S. mills (million tons)*
Projections—1970 relative prices				
1980	83.1	3.5	8.0	78.6
1990	116.1	3.5	8.0	111.6
2000	156.6	3.5	8.0	152.1
Projections—relative prices rising 0.5 percent per year				
1980	82.6	3.5	10.5	75.6
1990	114.3	3.5	12.5	105.3
2000	152.5	3.5	13.5	142.5
Projections—relative prices 10 percent above 1970 average				
1980	81.4	3.5	10.5	74.4
1990	113.8	3.5	11.5	105.8
2000	153.5	3.5	12.0	145.0

Demand on U.S. mills for paper and board.—Production of paper and board in U.S. mills has increased rapidly in recent decades to 59.3 million tons in 1972 (table 144). Meeting projected domestic and export demands at 1970 prices after allowances for imports, would require an increase in domestic production (demand on U.S. mills) to about 79 million tons by 1980 (medium projection), and to about 152 million tons in 2000.

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[42] United Nations Food and Agriculture Organization. Outlook for pulp and paper consumption, production, and trade to 1985. Second Consultation on World Pulp and Paper Demand Supply and Trade. Rome. 1971.

[43] United Nations Food and Agriculture Organization and United Nations Economic Commission for Europe. European timber trends and prospects, 1950–1980 and interim review. Geneva. 1966.

United Nations Food and Agriculture Organization. Wood—world trends and prospects. Rome. 1967.

Japan Lumber Journal, Inc. Japan Lumber Journal. Tokyo. Biweekly.

Annual growth rates for domestic production of paper and board averaged about 4.4 percent in the 1960's. Projected increases in demand on U.S. mills (medium level—1970 relative prices) average only 3.9 percent annually in the 1970's, and 3.1 percent in the 1990's.

Despite the drop in rates of growth, projected increases in demand on U.S. mills would require a very large expansion of the domestic paper and board industry in the next three decades. In the 1980's the medium projection of demands, with rising relative prices, increases by about 3.0 million tons a year, with further growth to over 3.7 million tons annually in the 1990's. In the 1960's production increased about 1.9 million tons a year.

Under the alternative and higher price assumptions, demand on U.S. mills would be lowered somewhat (see tabulation above) because of a reduction in total demand and an increase in imports. Demands on U.S. mills would still involve a much larger expansion of the U.S. industry than anything experienced in the past.

Demand for Fibrous Material for Paper and Board Manufacture

The manufacture of 59.3 million tons of paper and board in the United States in 1972 required some 58.8 million tons of fibrous material, including some 46.6 million tons of woodpulp, 11.3 million tons of wastepaper, and 0.9 million tons of cotton, bagasse, and other fibers (table 145; fig. 73; Append. V, table 23). The trend in consumption of all fibrous material has closely paralleled the trend in paper and board production, more than doubling since 1950 and increasing about 9 times since 1919.

In contrast to this upward trend, average use of fibrous materials per ton of paper and board produced has been nearly constant in recent decades—varying between 0.992 and 1.092 tons since the late 1920's (table 145, fig. 73; Append. V, table 23). It was assumed that average use would remain at a level of 1.03 tons through the projection period.[44]

Although there has not been much change in the use of fibrous materials per ton of production, there have been large changes in the mix of fibers consumed. In the last two decades, for example, new woodpulp has risen from roughly 64 percent of the total fibrous materials used to around 80 percent of the total. Use of wastepaper, on the other hand, declined from 31 percent of the total fibers used in 1950 to around 19 percent in 1972. Use of other fibers dropped from about 5 percent to less than 2 percent.

The sharp upward trend in use of new woodpulp, and the concomitant decline in the proportion of wastepaper used, reflect many technical and economic factors. For example, use of new woodpulp results in relatively stronger and lightweight paper and board products. New woodpulps are relatively free of biological and other contaminants. Integration of the industry with production of both pulp and paper concentrated in large complexes designed to fully utilize the timber harvested has tended to favor production of virgin pulps over wastepaper reuse. Use of recycled

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[44] The assumed increase in the use of wastepaper per ton of paper and board produced discussed below would tend to raise this average. However, it was assumed that this would be offset by increasing use of nonfiber additives and improvements in technology.

Fibrous materials consumed in the manufacture of paper and board, 1920-71, with projections to 2000

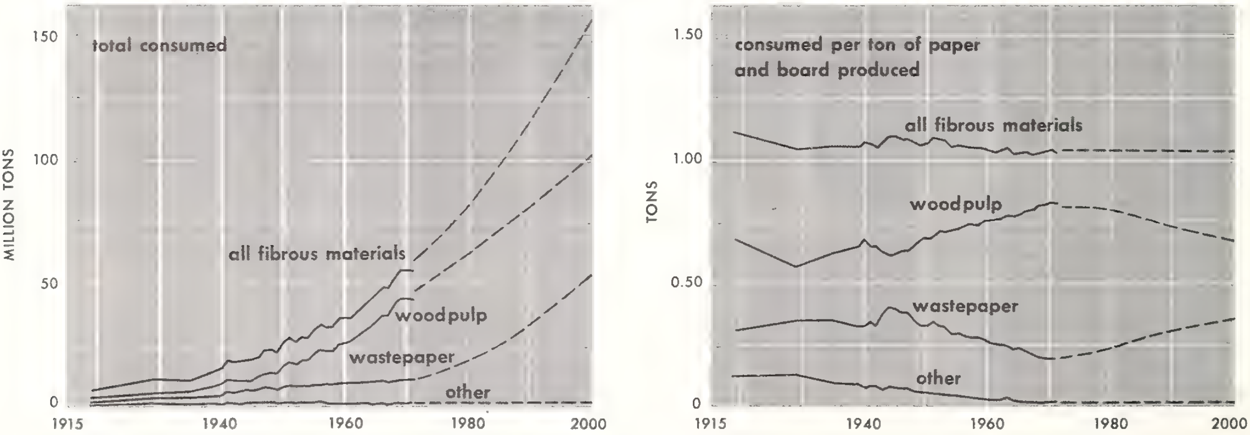

Figure 73

TABLE 145.—*Fibrous materials consumed in the manufacture of paper and board 1919–72, with projections (1970 relative prices) to 2000* [1]

Year	Consumption of fibrous materials				Consumption of fibrous materials per ton of paper and board produced			
	Total	Wood-pulp	Waste-paper	Other	Total	Wood-pulp	Waste-paper	Other
	Million tons	*Million tons*	*Million tons*	*Million tons*	*Tons*	*Tons*	*Tons*	*Tons*
1919	6.6	4.0	1.9	0.7	1.110	0.674	0.311	0.125
1929	11.6	6.3	3.8	1.4	1.039	.565	.345	.129
1935	11.0	6.4	3.6	1.0	1.050	.615	.342	.092
1939	14.2	8.7	4.4	1.2	1.049	.640	.323	.086
1940	15.5	9.8	4.7	1.0	1.070	.675	.322	.072
1945	19.0	10.8	6.8	1.3	1.092	.623	.391	.077
1950	25.9	16.5	8.0	1.4	1.062	.677	.326	.059
1955	31.8	21.5	9.0	1.3	1.056	.711	.300	.045
1960	35.7	25.7	9.0	1.0	1.036	.746	.262	.028
1965	45.1	34.0	10.2	.9	1.024	.772	.232	.020
1966	48.5	36.9	10.6	1.0	1.029	.784	.224	.021
1967	47.7	37.0	9.9	.8	1.017	.788	.211	.018
1968	52.4	41.3	10.2	.9	1.023	.806	.199	.018
1969	55.5	43.7	10.9	.9	1.024	.806	.202	.016
1970 [2]	54.6	43.2	10.6	.8	1.021	.807	.198	.015
1971 [2]	56.0	44.2	11.0	.9	1.017	.802	.200	.016
1972 [2]	58.8	46.6	11.3	.9	.991	.786	.190	.015
Low projections								
Year	Demand for fibrous materials by U.S. mills				Consumption of fibrous materials per ton of paper and board produced			
1980	75.9	58.2	17.0	.7	1.030	0.790	0.230	0.010
1990	101.0	70.6	29.4	1.0	1.030	.720	.300	.010
2000	129.7	84.3	44.1	1.3	1.030	.670	.350	.010
Medium projections								
1980	81.0	62.1	18.1	.8	1.030	.790	.230	.010
1990	115.0	80.4	33.5	1.1	1.030	.720	.300	.010
2000	156.6	101.9	53.2	1.5	1.030	.670	.350	.010
High projections								
1980	87.0	66.8	19.4	.8	1.030	.790	.230	.010
1990	132.1	92.3	38.5	1.3	1.030	.720	.300	.010
2000	191.3	124.4	65.0	1.9	1.030	.670	.350	.010

[1] Data may not add to totals because of rounding.

[2] Preliminary.

Sources: American Paper Institute. *Wood pulp statistics.* New York. 1972. (annual); U.S. Department of Commerce, Bureau of the Census. *Pulp, paper and board.* Cur. Indus. Reps. Ser. M26A. (annual); and U.S. Department of Agriculture, Forest Service.

fibers also has been inhibited by high costs of collecting, sorting, cleaning, and transporting wastepaper.

Projected use of wastepaper.—New forces are developing, however, that appear likely to change the relative importance of new and recycled pulps.[45] Increasing concern over pollution of the environment, and the growing costs and difficulties of solid waste disposal, have stimulated much interest and action by Government and industry to increase recycling.

For example, Federal and other agencies have modified purchase specifications to require minimum proportions of recycled fibers in some paper and board purchases. Research also is being stepped up to identify ways of increasing reuse of wastepaper. Various other forms of assistance or regulation are being considered.

Although these things are underway announced expansion plans of the pulp and paper industry indicate that during the early 1970's use of wastepaper as a proportion of total fibrous materials used is not likely to increase appreciably. In the longer run, however, factors favoring greater recycling such as mentioned above, together with increasing competition for available timber, point to the likelihood of substantial growth in recycling of wastepaper.

Use of recycled fibers per ton of paper and board produced has therefore been assumed to rise from 0.19 ton in 1972 to 0.23 ton by 1980,[46] and to 0.35 ton by 2000 (table 145, fig. 73). The latter level is close to rates currently achieved in such countries as Japan and the Netherlands, and to use achieved for a time in the United States during World War II. Conversely, projected use of new woodpulp drops from 0.81 ton in 1970 to 0.67 ton in 2000. Estimated use of other fibrous materials remains unchanged at about 1 percent of the total.

Total demands for wastepaper given the above rates would rise from about 11 million tons in 1970 to 18 million tons by 1980 and to 53 million tons by 2000. Such projected reuse in 2000 would probably be close to a practical maximum considering availability and cost factors. Part of the paper and board consumed for such purposes as books and records is not available for recycling. Other parts are scattered or in locations remote from recycling plants, so badly contaminated as to prohibit reuse, or destroyed by the first use.

Projected demand for woodpulp for paper and board.—Under the above assumptions on future fiber mix, the medium projection of demand for woodpulp for production of paper and board in the United States at 1970 relative prices rises from 46.6 million tons in 1972 to 62.1 million tons by 1980, and to 101.9 million tons by 2000. This would require an average annual increase in woodpulp consumption of 1.9 million tons in the 1970's and 2.2 million tons in the 1990's.

As in the case of paper and board, rates of increase in projected demand for woodpulp for the domestic manufacture of paper and board calculated from trend values fall rather sharply over the projection period, from 5.4 percent per year in the 1950–70 period to 3.1 percent in the 1970's and to 2.4 percent in the 1990's

Demand for woodpulp in nonpaper products.—In addition to pulp used in the manufacture of paper and board, about 1.3 million tons of woodpulp was used in 1972 for products such as rayon, cellulose acetate, and plastics. This was below the peak of 1.5 million tons attained in 1969, but some 4.6 times consumption in 1940 (table 146). Per capita use has also increased substantially since 1940.

Since the late 1940's there has been a fairly close statistical relationship between changes in the consumption of woodpulp in the manufacture of nonpaper products and changes in gross national product. Primarily on the basis of this relationship, demand (medium level) was projected to grow to 2.2 million tons in 1980, with a further increase to 4.4 million tons in 2000. Average annual rates of growth drop from 4.2 percent in the 1960's to 3.9 percent in the 1970's and 3.5 percent in the 1990's.

Total projected U.S. demand for woodpulp.—Apparent consumption of woodpulp in the manufacture of both paper and board and nonpaper products in the United States totaled 47.8 million tons in 1972 (table 147; Append. V, table 24). The medium projection of demand at 1970 prices reaches 106.3 million tons by 2000—a 2.4-fold increase over 1970. Annual rates of growth in woodpulp demand decline from an average of 5.5 percent in the 1960's to 4.0 percent in the 1970's, and 2.4 percent in the 1990's.

Exports of woodpulp.—In addition to domestic demand, a significant export market for woodpulp

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[45] See for example:

American Paper Institute. 1970 a test of stamina. New York. 1971.

Joseph E. Atchison Consultants, Inc. Report on a preliminary study of waste paper and prospects for its increased recycling. New York. 1970.

Midwest Research Institute. Paper recycling, the art of the possible 1970–1985. Kansas City. 1973.

Perry, Henry J. The economics of waste paper use: Part I. Pulp and Paper 45(4):83–84; and The economics of waste paper reuse: Part II. Pulp and Paper 45(5):82–84.

Tuchman, Samson G. The economics of the waste paper industry. Ph.D. dissertation. Dept. of Economics, New York Univ. New York. 1963.

U.S. Department of Commerce, Bureau of Domestic Commerce. Pulp, paper and board. Industry Reps. XXVI (3). Quarterly. 1970.

Williams, Ward C. CCA makes corrugating medium at 1,100 ft./min. from 100% waste paper. Pulp and Paper 44(12):112–116; and Use it/reuse it! political, economic pressures brighten future for waste. 44(10):61–65.

[46] The Midwest Research Institute in its report "Paper recycling the art of the possible," op. cit., estimated that the recycling rate would rise to 24 percent by 1990.

TABLE 146.—*Woodpulp consumed in the manufacture of nonpaper products, selected years 1940–72, with projections of demand (1970 relative prices) to 2000* [1]

Year	Total	Per capita
	Thousand tons	*Pounds*
1940	278	4
1945	527	8
1950	703	9
1955	829	10
1960	1,025	11
1965	1,310	14
1966	1,370	14
1967	1,201	12
1968	1,441	14
1969	1,518	15
1970 [2]	1,238	12
1971 [2]	1,234	12
1972 [2]	1,290	12
Low projections		
1980	2,000	18
1990	2,800	23
2000	3,700	28
Medium projections		
1980	2,200	19
1990	3,100	24
2000	4,400	31
High projections		
1980	2,300	20
1990	3,500	26
2000	5,200	35

[1] Projections based on alternative assumptions about growth in population and economic activity as specified in the introductory section of this chapter.

[2] Preliminary.

Source: American Paper Institute. *Wood pulp statistics.* New York. 1972. (Annual).

TABLE 147.—*Woodpulp consumption, exports, imports, and domestic production, selected years 1920–72, with projections*[1] *(1970 relative prices) to 2000* [2]

[Million tons]

Year	Apparent consumption	Exports	Imports	Domestic production
1920	4.7	(3)	0.9	3.8
1925	5.6	(3)	1.7	4.0
1930	6.4	(3)	1.8	4.6
1935	6.7	0.2	1.9	4.9
1940	9.7	.5	1.2	9.0
1945	11.8	.1	1.8	10.2
1950	17.1	.1	2.4	14.8
1955	22.3	.6	2.2	20.7
1960	26.6	1.1	2.4	25.3
1965	35.7	1.4	3.1	34.0
1966	38.4	1.6	3.4	36.6
1967	38.1	1.7	3.2	36.7
1968	42.5	1.9	3.5	40.9
1969	44.8	2.1	4.0	42.8
1970 [4]	44.1	3.1	3.5	43.7
1971 [4]	45.3	2.2	3.5	43.9
1972 [4]	47.8	2.3	3.7	46.3

Low projections

Year	Domestic demand	Exports	Imports	Demand on U.S. mills
1980	60.2	3.5	4.0	59.7
1990	73.4	3.5	4.0	72.9
2000	88.0	3.5	4.0	87.5
Medium projections				
1980	64.3	3.5	4.0	63.8
1990	83.5	3.5	4.0	83.0
2000	106.3	3.5	4.0	105.8
High projections				
1980	69.1	3.5	4.0	68.6
1990	95.8	3.5	4.0	95.3
2000	129.6	3.5	4.0	129.1

[1] Projections based on alternative assumptions about growth in population and economic activity as specified in the introductory section of this chapter.

[2] Data may not add to totals because of rounding.

[3] Less than 50,000 tons.

[4] Preliminary.

Sources: American Paper Institute. *Wood pulp statistics.* 1972. (Annual); and *Monthly statistical summary.* New York; and U.S. Department of Agriculture, Forest Service.

has developed in recent years. Between 1950 and 1970, for example, woodpulp exports rose from 0.1 million to 3.1 million tons, but subsequently declined to 2.3 million tons in 1972 (table 147; Append. V, table 24). Most of the growth in exports in the 1960's was in sulphate pulp and dissolving and special alpha pulps.

Although woodpulp is shipped to all parts of the world, most exports go to western Europe, the Far East, and Latin America (Append. V, table 25). The increase in shipments to western Europe has been especially rapid, rising from 31,000 tons in 1950 to 1.1 million in 1971. In the same period shipments to the Far East—chiefly to Japan, Korea, and India—rose from 6,000 tons to 533,000 tons. Exports to Latin America have also shown substantial growth from 22,000 tons in 1950 to 277,000 tons in 1971.

As indicated in Chapter IV, various studies point to rapid and continuing increases in world demands for pulp and paper and board, as well as for other wood products. These studies also indicate that available timber supplies of acceptable quality may not be large enough to meet these expanding demands. Although expanded markets for pulp exports from the United States can be expected, it was assumed that pulp exports will level off at 3.5 million tons in view of the major rise in projected U.S. demands for pulp, tightening timber supply situation in the United States as described in Chapter VI and prospective increases in fiber supplies from other regions of the world.

Imports of woodpulp.—In contrast to the recent rise in pulp exports, the United States has long imported substantial volumes of woodpulp (table 147; Append. V, table 24). Pulp imports approached 2 million tons in the 1920's—a level that with some fluctuation was maintained through the 1950's. In the 1960's, however, pulp imports rose fairly rapidly, and in the late 60's and early 70's were ranging between 3.5 and 4.0 million tons a year. In earlier years Scandinavia provided much of the imports, but in 1971, 96 percent of the imported pulp came from Canada (Append. V, table 26).

In view of the higher costs that would presumably be associated with the use of unexploited timber resources in Canada (see discussion Chapter IV), Canadian pulp producers probably would not significantly increase shipments over recent volumes unless prices rise above 1970 levels. Hence, it was assumed that at 1970 relative prices imports would remain about 4 million tons annually.

With higher prices it seems likely that Canadian producers would supply much larger quantities of woodpulp. Accordingly, woodpulp imports have been increased substantially under the higher price assumptions as shown in the following tabulation of medium projections of demand under alternative price assumptions:

Projections—1970 relative prices

Year	*Total demand (million tons)*	*Exports (million tons)*	*Imports (million tons)*	*Demand on U.S. mills (million tons)*
1980	64.3	3.5	4.0	63.8
1990	83.5	3.5	4.0	83.0
2000	106.3	3.5	4.0	105.8
Projections—relative prices rising 0.5 percent per year				
1980	61.9	3.5	6.0	59.4
1990	78.9	3.5	7.5	74.9
2000	99.8	3.5	8.5	94.8
Projections—relative prices 10 percent above 1970 average				
1980	61.0	3.5	6.0	58.5
1990	79.2	3.5	7.0	75.7
2000	101.5	3.5	7.5	97.5

Demand on U.S. mills for woodpulp.—When projected pulp imports are subtracted from total domestic and export demands, an estimated 64 million tons (medium projection) of woodpulp would be demanded from U.S. mills by 1980 at 1970 relative prices (table 147). A further rise to 106 million tons by 2000 is projected.

Under the alternative higher prices demand on U.S. mills would be somewhat lower because of reductions in domestic demand and increased imports.

Annual rates of growth in demand drop under all assumptions. For example, with the medium projection of population and economic growth and 1970 relative prices, rates drop from 3.8 percent in the 1970's to 2.5 percent in the 1990's. Part of the decline after the mid-1970's reflects an anticipated fall-off in use of new woodpulp per ton of paper and board manufactured (fig. 73).

Projected increases in domestic production (medium projection) at 1970 relative prices indicate it would be necessary to expand U.S. woodpulp production by about 2 million tons a year in the 1970's. This would be close to the average increase in the 1960's. Under the rising price assumption the projected increase (medium projection) would average 1.6 million tons per year.

Pulpwood Consumption and Demand

Consumption of pulpwood in U.S. mills to produce the tonnage of pulp shown in table 147 increased from about 6 million cords in 1920 to more than 72 million cords in 1972 (table 148; Append. V, table 27).

Pulpwood used per ton of pulp.—Since 1920 average use of pulpwood per ton of pulp produced has not changed significantly, averaging about 1.6 cords per ton (fig. 74; Append. V, table 28). During this period some technological developments have tended to increase yields of pulp per cord of wood consumed. These have included a major shift from sulfite and soda processes to higher yielding sulfate and semichemical processes. There has also been a large relative increase in use of hardwoods which yield more pulp per cord than softwoods. Offsetting these trends, however, has been an increase in proportions of semibleached and bleached grades of woodpulp which require more wood per ton than unbleached grades.

It has been assumed that the net effect of technological developments in the future, together with further increases in use of hardwoods, will cause a slight decline in consumption of pulpwood per ton of pulp produced to an average of about 1.5 cords by 2000.

Multiplying assumed wood requirements per ton of pulp by projected domestic production of woodpulp indicates a potential demand for pulpwood in U.S. mills (medium projection at 1970 relative prices) of about 98 million cords by 1980, and 159 million cords by 2000 (table 148).

Exports of pulpwood.—Prior to the late 1960's pulpwood exports from the United States were

TABLE 148.—*Pulpwood consumption, exports, imports and domestic production, selected years 1920–72, with projections (1970 relative prices) to 2000 under alternative assumptions on population and economic growth* [1]

[Million cords]

Year	Total domestic consumption and exports	Domestic consumption		Exports				Imports				Domestic production of pulpwood				
		Total [2]	In U.S. mills	Total	Pulpwood	Woodpulp [3]	Paper and board [3]	Total	Pulpwood	Woodpulp [3]	Paper and board [3]	Total	Roundwood			Plant byproducts [3]
													Total	Softwood	Hardwood	
1920	8.6	8.2	6.1	0.5	----------	----------	0.5	3.8	1.2	1.6	1.0	4.9	4.7	4.2	0.5	0.2
1925	11.0	10.7	6.1	.3	----------	0.1	.2	6.4	1.5	3.0	2.0	4.6	4.5	4.0	.5	.2
1930	13.6	13.1	7.2	.5	0.1	.1	.3	7.9	1.6	3.3	3.0	5.7	5.2	4.5	.7	.6
1935	14.4	13.8	7.6	.6	----------	.3	.2	7.8	1.0	3.6	3.1	6.6	6.3	5.6	.8	.3
1940	19.7	18.1	13.7	1.6	.1	.9	.6	7.3	1.4	2.2	3.6	12.4	12.1	10.8	1.3	.2
1945	23.6	22.7	16.8	.9	----------	.3	.6	8.3	1.6	3.2	3.5	15.3	14.9	12.8	2.1	.4
1950	32.7	32.0	22.1	.7	----------	.2	.4	12.0	1.4	4.3	6.3	20.7	19.5	16.7	2.8	1.2
1955	43.6	41.3	32.7	2.3	.1	1.2	1.0	12.6	1.8	3.9	6.8	31.0	28.6	23.4	5.2	2.4
1960	52.7	49.1	41.2	3.6	.2	2.2	1.2	12.7	1.3	4.2	7.2	40.0	33.5	25.4	8.0	6.5
1965	67.4	62.4	53.5	5.0	.2	2.7	2.2	15.1	1.3	5.3	8.5	52.3	40.3	29.2	11.0	12.0
1966	72.6	67.0	57.2	5.6	.3	2.9	2.4	16.5	1.4	5.7	9.4	56.1	41.8	29.6	12.2	14.2
1967	73.4	66.9	58.4	6.5	.6	3.4	2.6	15.9	1.6	5.4	8.9	57.5	41.8	30.1	11.7	15.7
1968	77.9	70.0	61.9	7.9	1.2	3.5	3.2	16.2	1.4	5.9	8.8	61.7	44.2	32.1	12.1	17.4
1969	84.1	75.1	66.2	9.0	1.7	3.9	3.4	17.2	1.0	6.8	9.3	66.9	47.1	33.6	13.5	19.8
1970 [4]	86.8	75.9	69.8	10.9	1.8	5.7	3.4	16.3	1.1	6.0	9.2	70.5	50.2	36.7	13.6	20.2
1971 [4]	85.5	75.9	68.0	9.6	1.5	3.4	4.7	17.1	1.2	5.4	10.5	68.3	46.7	33.4	13.3	21.6
1972 [4]	88.8	79.3	72.4	9.5	2.0	3.5	4.0	15.4	1.0	5.7	8.7	73.4	48.1	34.2	14.0	25.3

Year	Domestic demand and exports	Domestic demand		Exports				Imports				Demand for domestic pulpwood				
		Total [2]	In U.S. mills	Total	Pulpwood	Woodpulp [3]	Paper and board [3]	Total	Pulpwood	Woodpulp [3]	Paper and board [3]	Total	Roundwood from U.S. forests			Plant byproducts [3]
													Total	Softwood	Hardwood	
Low projections																
1980	111.3	98.6	91.9	12.7	3.0	5.4	4.3	17.7	1.3	6.2	10.2	93.6	64.6	42.3	22.3	29.0
1990	130.1	118.0	110.8	12.1	3.0	5.3	3.8	17.6	1.3	6.1	10.2	112.5	79.5	50.3	29.2	33.0
2000	150.4	138.7	131.2	11.7	3.0	5.2	3.5	17.5	1.3	6.0	10.2	132.9	97.9	58.8	39.1	35.0
Medium projections																
1980	117.7	105.0	98.3	12.7	3.0	5.4	4.3	17.7	1.3	6.2	10.2	100.0	71.0	47.3	23.7	29.0
1990	145.5	133.4	126.2	12.1	3.0	5.3	3.8	17.6	1.3	6.1	10.2	127.9	94.9	60.0	34.9	33.0
2000	177.9	166.2	158.7	11.7	3.0	5.2	3.5	17.5	1.3	6.0	10.2	160.4	125.4	75.2	50.2	35.0
High projections																
1980	125.0	112.3	105.6	12.7	3.0	5.4	4.3	17.7	1.3	6.2	10.2	107.3	78.3	51.2	27.1	29.0
1990	164.2	152.1	144.9	12.1	3.0	5.3	3.8	17.6	1.3	6.1	10.2	146.6	113.6	71.9	41.7	33.0
2000	212.8	201.1	193.6	11.7	3.0	5.2	3.5	17.5	1.3	6.0	10.2	195.3	160.3	96.2	64.1	35.0

[1] The alternative assumptions about growth in population and economic activity are shown in the introductory section of this chapter.

[2] Includes consumption of pulpwood in U.S. mills and the pulpwood equivalent of the net imports of paper, board, and woodpulp.

[3] Roundwood equivalent.

[4] Preliminary Forest Service estimates.

Note: Data may not add to totals because of rounding.

Sources: 1940–72—U.S. Department of Commerce, Bureau of the Census, *Pulp, paper, and board*. Curr. Ind. Reps. Ser. M26A (annual); *U.S. exports—schedule B commodity and country*. FT 410 (annual); *U.S. imports—general and consumption, schedule A commodity and country*. FT 135 (annual); American Paper Institute, *Monthly statistical summary*. New York (monthly). American Pulpwood Association, *Pulpwood statistics*. New York (monthly). U.S. Department of Agriculture, Forest Service.

Projections: U.S. Department of Agriculture, Forest Service.

Pulpwood consumed per ton of woodpulp produced, 1920-70 with projection to 2000

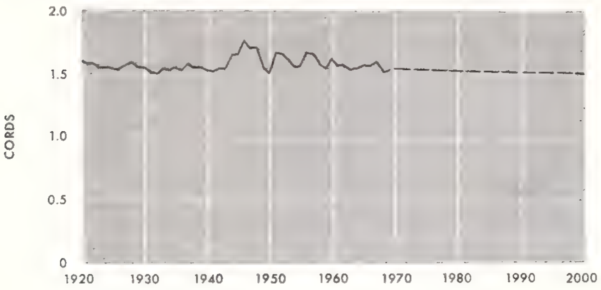

Figure 74

usually below 100,000 cords and were of little significance (table 148). Beginning in 1965, however, exports rose rapidly to a level of 2.0 million cords in 1972. Most of the increased exports went to Japan and were composed of chips produced from residues at sawmills on the Pacific Coast.

As discussed in Chapter IV, Japan is faced with growing timber deficits and rising demands for woodpulp and paper and board. It is thus likely to be in the market for larger and larger quantities of imported chips. Most of the presently available slabs, edgings, and veneer cores on the Pacific Coast are being utilized, but there are still substantial volumes of logging and fine mill residues in that area. With projected growth in demand for pulpwood by U.S. mills, limitations on U.S. timber supplies, and expectations of higher timber prices necessary to permit utilization of material now left as logging residues, it seems likely that further increases in pulpwood exports will be limited as shown in table 148.

Imports of pulpwood.—Imports of pulpwood for consumption in U.S. mills, nearly all from Canada, have fluctuated between 1 and 2 million cords a year for several decades (table 148). Because of Canadian constraints on shipments of unmanufactured wood, and the relatively high transportation costs of shipping pulpwood, no growth is anticipated in pulpwood imports.

Demand for domestic pulpwood.—Domestic production of pulpwood in the United States rose from about 5 million cords in 1920 to 73 million cords in 1972 (table 148). Meeting projected increases in pulpwood demand at U.S. mills after allowing for exports and imports of pulpwood would require an increase in U.S. pulpwood production to 100 million cords by 1980 (medium projection—1970 relative prices) and to 160 million cords by 2000. Rates of growth in these projections of pulpwood demand decline rather rapidly—from an average of 5.8 percent per year in the 1960's to 2.3 percent annually in the 1990's.

Pulpwood from plant residues.—Part of the pulpwood consumed in U.S. mills and exported has come from slabs, edgings, veneer cores, sawdust, and other material produced at primary manufacturing plants. Between 1950 and 1972 use of these materials increased from 1.2 million cords to 25.3 million cords (table 148, fig. 75). Although most of the economically available coarse material and some fines were utilized, unused volumes of chippable residues in the United States still amounted to 5.2 million cords in 1970. Unused sawdust and other fine residues in 1970 composed an additional 7.6 million cords of potentially usable material.

Some of the residues of primary manufacturing plants is so scattered geographically and in such small volumes that it will not be economically utilizable under foreseeable price increases. However, in estimating future demand for round pulpwood, it was assumed under all population, economic, and price assumptions that by 1980 most coarse plant residues, much of the fines, and some material formerly utilized as fuel would be used for pulp products or for particle board. It was also assumed that while greater use of smaller timber will tend to increase the total volume of residues, this would be offset by increased use of thinner saws and more precise manufacturing equipment which would reduce residue volumes.

Under these assumptions volumes of plant byproducts used as pulpwood are projected to rise to 35 million cords by 2000. These estimates of byproducts use are based upon the projections of timber supplies likely to be available for lumber and plywood production (with 1970 levels of forest management).

Demand for domestic roundwood.—Projected demands for domestic roundwood for pulpwood were derived by subtracting prospective supplies of plant byproducts from total projected demands for domestic pulpwood. The medium projection for roundwood at 1970 prices rises from 48.1 million cords in 1972 to 71 million cords in 1980, and to 125 million cords by 2000.

Pulpwood production, by source of material, 1920-72, with projections to 2000

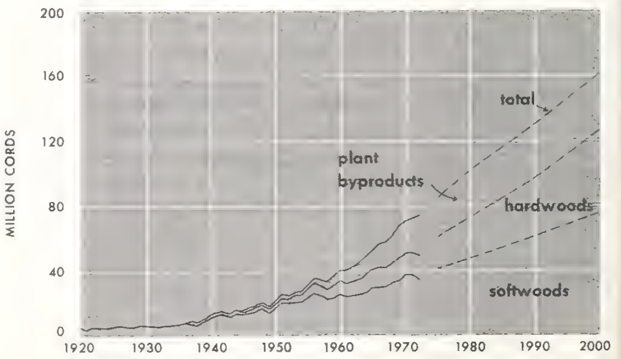

Figure 75

Softwoods have long been preferred for pulp and paper products because of such factors as relatively high strength properties and light color. In recent decades, however, use of hardwoods has increased rapidly in response to technological improvements in pulping, availability of substantial volumes of hardwood at relatively lower costs per ton of fiber, improvements in properties of many grades of paper and board with the addition of hardwood pulps, and rising competition and prices for softwood timber. The trend toward increased use of hardwoods is likely to be encouraged by a comparatively favorable supply situation, as indicated by the timber demand-supply comparisons in Chapter VI.

Based on recent trends and available technology, proportions of softwoods in the pulpwood harvest were assumed to continue to decline from 71 percent of the total roundwood used in 1972 to about 66 percent by 1980 and 60 percent by 2000, with corresponding increases in proportions of hardwood pulpwood.

Although pulpwood generally is obtained from smaller sizes and lower grades of timber, substantial volumes of sawtimber suitable for lumber and plywood also are consumed in the production of paper and board. In 1970, for example, an estimated 7 billion board feet of softwood sawtimber, and 2 billion board feet of hardwood sawtimber, were used in pulp manufacture. In many cases the saw-log material used for pulp was of relatively low grade. In other cases, where sawtimber trees are scattered, for example, or where pulp timber is harvested from small tracts by small producers, considerable volumes of sawtimber of high quality have been used.

Other developments such as rising timber values and local shortages of wood have been encouraging greater use of small trees and material formerly left as logging residues. It also seems likely that new technological developments leading to practical methods of bark-chip separation, and/or acceptance of bark in the furnishes of some grades of paper and board, will lead to greater use of small stems, limbs, and cull trees that have been previously unused. It has, therefore, been assumed that while the total quantity of sawtimber used for pulp will continue to increase, the proportion of the total pulpwood mix made up of sawtimber will decline moderately.

Demand for pulpwood including the roundwood equivalent of net imports of paper, board, and woodpulp.—In addition to pulpwood from U.S. forests, a substantial volume of wood is represented by imports of pulp, paper, and board. In 1972, for example, the roundwood equivalent of such net imports was 6.9 million cords. With this added to domestic production, the total volume of pulpwood required to manufacture the paper, board, and woodpulp consumed in the United States in 1972 was 79.3 million cords.

Exports of pulpwood and pulpwood products (pulp, paper, and board) in 1972 were equivalent to 9.5 million cords. Thus, total domestic and export demand for pulpwood in 1972 amounted to 88.8 million cords.

Projected demands for pulpwood for U.S. consumption, including the roundwood equivalent of net imports of woodpulp and paper and board, rise from 79.3 million cords in 1972 to 166 million cords by 2000 (medium projection, 1970 relative prices).

Total pulpwood demands for both U.S. consumption and exports—to be supplied from U.S. or foreign resources—are projected to increase to 178 million cords by 2000, or double the 1972 levels.

Demand for pulpwood under alternative assumptions.—The alternative population and gross national product assumptions adopted in this study have a sizeable impact on demands for pulpwood at 1970 relative prices (table 148). For example, in 2000 projected demands for pulpwood for U.S. consumption vary between 139 million and 201 million cords.

As indicated in the introductory section of this Chapter, it has been assumed that demands for paper and board are quite inelastic, that is, price changes have relatively little effect on demand. Thus, the alternative price assumptions used in this study have relatively little effect on projected demands for pulpwood (table 149). For example, a rise in relative prices of paper and board at the longrun historical rate—about 0.5 percent per year—would reduce the medium projection of pulpwood demand in the United States by only 1.7 percent in the year 2000 (table 149).

If timber supplies are not adequate in future years to meet the projected increases in demands for both pulpwood and other timber products, as indicated by the data in Chapter VI, sizeable price increases for paper and board will be necessary to enable the pulp industry to compete for wood. Also other fibers—wastepaper, bark, limbs and tops, tropical hardwoods, kenaf, and plastics—would be used to a greater extent.

DEMAND FOR MISCELLANEOUS TIMBER PRODUCTS

As shown in the tabulation below, a variety of miscellaneous industrial roundwood products are consumed in the United States.

Product	*Standard unit of measure*	*1952*	*1962*	*1970*
Cooperage	Million board feet	355.3	216.0	214.7
Piling	Million linear feet	41.2	41.5	28.8
Poles	Million pieces	6.5	6.7	5.4
Posts	Million pieces	306.0	168.7	97.7
Mine timbers	Million cubic feet	81.0	48.4	32.1
Other industrial products[1]	Million cubic feet	235.2	157.6	198.8
All miscellaneous products	Million cubic feet	698.8	465.4	424.0

[1] Includes charcoal wood, roundwood used in the manufacture of particleboard; poles and rails used in fencing; bolts used for products such as shingles, wood turnings, and handles, and other miscellaneous items such as hop poles.

TABLE 149.—*Pulpwood consumption, exports, imports, and domestic production, selected years 1920–72, with projections under alternative price assumptions* [1] *(medium projections of growth in population and economic activity) to 2000*

[Millions cords]

Year	Total domestic consumption and exports	Domestic consumption		Exports				Imports				Domestic production of pulpwood				
		Total [2]	In U.S. mills	Total	Pulpwood	Wood-pulp [3]	Paper and board [3]	Total	Pulpwood	Wood-pulp [3]	Paper and board [3]	Total	Roundwood			Plant by-products [3]
													Total	Softwood	Hardwood	
1920	8.6	8.2	6.1	0.5	---	---	0.5	3.8	1.2	1.6	1.0	4.9	4.7	4.2	0.5	0.2
1925	11.0	10.7	6.1	.3	---	0.1	.2	6.4	1.5	3.0	2.0	4.6	4.5	4.0	.5	.2
1930	13.6	13.1	7.2	.5	.1	.1	.3	7.9	1.6	3.3	3.0	5.7	5.2	4.5	.7	.6
1935	14.4	13.8	7.6	.6	---	.3	.2	7.8	1.0	3.6	3.1	6.6	6.3	5.6	.8	.3
1940	19.7	18.1	13.7	1.6	.1	.9	.6	7.3	1.4	2.2	3.6	12.4	12.1	10.8	1.3	.2
1945	23.6	22.7	16.8	.9	---	.3	.6	8.3	1.6	3.2	3.5	15.3	14.9	12.8	2.1	.4
1950	32.7	32.0	22.1	.7	---	.2	.4	12.0	1.4	4.3	6.3	20.7	19.5	16.7	2.8	1.2
1955	43.6	41.3	32.7	2.3	.1	1.2	1.0	12.6	1.8	3.9	6.8	31.0	28.6	23.4	5.2	2.4
1960	52.7	49.1	41.2	3.6	.2	2.2	1.2	12.7	1.3	4.2	7.2	40.0	33.5	25.4	8.0	6.5
1965	67.4	62.4	53.5	5.0	.2	2.7	2.2	15.1	1.3	5.3	8.5	52.3	40.3	29.2	11.0	12.0
1966	72.6	67.0	57.2	5.6	.3	2.9	2.4	16.5	1.4	5.7	9.4	56.1	41.8	29.6	12.2	14.2
1967	73.4	66.9	58.4	6.5	.6	3.4	2.6	15.9	1.6	5.4	8.9	57.5	41.8	30.1	11.7	15.7
1968	77.9	70.0	61.9	7.9	1.2	3.5	3.2	16.2	1.4	5.9	8.8	61.7	44.2	32.1	12.1	17.4
1969 [4]	84.1	75.1	66.2	9.0	1.7	3.9	3.4	17.2	1.0	6.8	9.3	66.9	47.1	33.6	13.5	19.8
1970 [4]	86.8	75.9	69.8	10.9	1.8	5.7	3.4	16.3	1.1	6.0	9.2	70.5	50.2	36.7	13.6	20.2
1971 [4]	85.5	75.9	68.0	9.6	1.5	3.4	4.7	17.1	1.2	5.4	10.5	68.3	46.7	33.4	13.3	21.6
1972 [4]	88.8	79.3	72.4	9.5	2.0	3.5	4.0	15.4	1.0	5.7	8.7	73.4	48.1	34.2	14.0	25.3

Projections—1970 relative prices

Year	Domestic demand and export	Domestic demand		Exports				Imports				Demand for domestic pulpwood				
		Total [2]	In U.S. mills	Total	Pulpwood	Woodpulp [3]	Paper and board [3]	Total	Pulpwood	Woodpulp [3]	Paper and board [3]	Total	Roundwood from U.S. forests			Plant by-products [3]
													Total	Softwood	Hardwood	
1980	117.7	105.0	98.3	12.7	3.0	5.4	4.3	17.7	1.3	6.2	10.2	100.0	71.0	47.3	23.7	29.0
1990	145.5	133.4	126.2	12.1	3.0	5.3	3.8	17.6	1.3	6.1	10.2	127.9	94.9	60.0	34.9	33.0
2000	177.9	166.2	158.7	11.7	3.0	5.2	3.5	17.5	1.3	6.0	10.2	160.4	125.4	75.2	50.2	35.0

Projections—Rising relative prices [5]

Year	Domestic demand and export	Domestic demand Total [2]	In U.S. mills	Exports Total	Pulpwood	Woodpulp [3]	Paper and board [3]	Imports Total	Pulpwood	Woodpulp [3]	Paper and board [3]	Demand for domestic pulpwood Total	Roundwood Total	Softwood	Hardwood	Plant by-products [3]
1980	117.0	104.3	91.5	12.7	3.0	5.4	4.3	23.8	1.3	9.2	13.3	93.2	64.2	42.0	22.2	29.0
1990	144.1	132.0	113.8	12.1	3.0	5.3	3.8	28.6	1.3	11.4	15.9	115.5	82.5	52.2	30.3	33.0
2000	175.1	163.4	142.2	11.7	3.0	5.2	3.5	31.2	1.3	12.8	17.1	143.9	108.9	65.3	43.6	35.0

Projections—Relative prices of paper and board 10 percent above 1970 levels

Year	Domestic demand and export	Domestic demand Total [2]	In U.S. mills	Exports Total	Pulpwood	Woodpulp [3]	Paper and board [3]	Imports Total	Pulpwood	Woodpulp [3]	Paper and board [3]	Demand for domestic pulpwood Total	Roundwood Total	Softwood	Hardwood	Plant by-products [3]
1980	115.6	102.9	90.1	12.7	3.0	5.4	4.3	23.8	1.3	9.2	13.3	91.8	62.8	41.1	21.7	29.0
1990	143.3	131.2	115.1	12.1	3.0	5.3	3.8	26.5	1.3	10.6	14.6	116.8	83.8	53.0	30.8	33.0
2000	175.6	163.9	146.2	11.7	3.0	5.2	3.5	27.7	1.3	11.2	15.2	147.9	112.9	67.7	45.2	35.0

[1] Projections based on alternative price assumptions as specified in the introductory section.

[2] Includes consumption of pulpwood in U.S. mills and the pulpwood equivalent of the net imports of paper, board, and woodpulp.

[3] Roundwood equivalent.

[4] Preliminary, Forest Service estimates.

[5] With relative prices of paper and board rising at an annual rate of 0.5 percent.

Note: Data may not add to totals because of rounding.

Sources: 1940–72—U.S. Department of Commerce, Bureau of the Census. *Pulp, paper, and board.* Curr. Ind. Reps. Ser. M26A (annual); *U.S. exports—schedule B commodity and country.* FT 410 (annual); *U.S. imports—general and consumption, schedule A commodity and country.* FT 135 (annual); American Paper Institute. *Monthly statistical summary.* New York (monthly). American Pulpwood Association. *Pulpwood statistics.* New York (monthly). U.S. Department of Agriculture, Forest Service.

Projections: U.S. Department of Agriculture, Forest Service.

Total consumption of these products amounted to 424 million cubic feet in 1970. This was somewhat below the general level of the 1960's when estimated consumption averaged about 500 million cubic feet per year, and far below consumption of more than 2 billion cubic feet annually in the early 1900's.

Additional volumes of plant byproducts such as sawdust, slabs, and edgings used in the production of products such as charcoal and chemicals amounted to 185 million cubic feet in 1970. Thus, total wood consumption for miscellaneous products in that year amounted to a little over 600 million cubic feet. International trade in these products is small and consumption has been roughly equal to production.

The downward trend in consumption of miscellaneous industrial roundwood products which began around 1910 appears to have leveled off in the past decade. For this report it was therefore assumed that demand for these products will remain close to 500 million cubic feet with all price assumptions. However, individual products are likely to show divergent trends as indicated below.

Cooperage Logs and Bolts

In the early 1900's roundwood used in manufacture of barrels, kegs, pails, and tubs made of wood staves totaled about 1.8 billion board feet annually—about 40 percent in tight cooperage and 60 percent in slack cooperage. Since then new technology, changes in consumer buying habits, and new packaging techniques have sharply reduced demands for cooperage.

By the 1960's consumption had dropped to about 200 million board feet, of which about 70 percent was for tight cooperage and 30 percent for slack cooperage. Over half of the tight cooperage was used in bourbon barrels, with the remainder used for chemical and other containers. The slack cooperage was mainly used for barrels for food and hardware. Future demands for cooperage logs and bolts are expected to continue close to the level of recent years.

Poles and Piling

Use of wood poles in the construction and maintenance of utility lines and other structures has been relatively stable in recent years. In the period 1962–70, for example, volume of poles treated with preservatives averaged nearly 80 million cubic feet annually, or slightly more than in the previous decade. Although there is a trend away from use of poles in new residential areas, anticipated expansion of demands for electric and communication facilities, growing needs for pole replacements, and the expanding use of poles in construction are expected to result in some increase in demand for poles over the projection period.

Treated wood piling used in construction of docks, bridges, and buildings averaged about 17 million cubic feet a year in the period 1962–70. In addition, an estimated 10 million cubic feet of untreated piling was used annually in this period. In view of projected increases in construction, a modest increase in demand through the projection period is considered likely.

Fence Posts

Use of wood posts for farm fencing and other purposes such as highway barricades and yard enclosures dropped from an estimated 900 million posts in 1920 to about 170 million in 1962 and approximately 98 million (68 million cubic feet) in 1970. This decline was a result of several factors, including substitution of steel posts, increased use of preservative-treated wood posts, and changes in farm size and farming methods that involve less use of fencing. These forces are expected to result in further reduction in demands in future decades.

Other Industrial Wood

Use of round, split, and hewn mine timbers fell from an estimated 174 million cubic feet in 1923 to 48 million cubic feet in 1962, and 32 million cubic feet in 1970. Projected increases in production from underground mines, however, suggest that this trend may be reversed.

Consumption of wood for a wide variety of products such as particleboard, charcoal and wood distillation products, shingles, excelsior, hewn ties, turnery products, and miscellaneous farm timbers amounted to about 200 million cubic feet of roundwood plus an estimated 184 million cubic feet of plant byproducts in 1970. Wood consumption for some of these products, especially particleboard, has been rising, but there have been offsetting declines in other uses. It has been assumed that future use will continue about at the 1970 level.

DEMAND FOR FUELWOOD

Fuelwood consumption in 1970 was estimated at 16 million cords. This included approximately 314 million cubic feet of roundwood from growing stock and 228 million cubic feet of roundwood from other sources such as dead and cull trees, plus 723 million cubic feet of primary plant residues. Fuelwood cut from roundwood was used almost entirely for domestic heating and cooking. Plant residues were used both for domestic purposes and for steam power in wood processing plants.

Fuelwood consumption dropped sharply in the first five decades of the present century because of the substitution of oil, gas, coal, and electricity in home cooking, heating, and industrial uses. In recent years, however, substantial markets have developed in metropolitan areas for fireplace wood. Expected increases in income, population, and residential construction indicate this market may continue to grow.

In this study it has been assumed that demand for round fuelwood would continue at about the 1970 level through the projection period although new air pollution standards could reduce this demand.

LOG EXPORTS AND IMPORTS

The above discussion has been primarily concerned with demand for processed timber products. In addition, between the late 1950's and 1972, exports of logs from the United States rose from around 100 million board feet (local log scale) to 3.1 billion board feet, shown by the following tabulation.

Volume and destination (million board feet, local log rules)

Year	*Total*	*Japan*	*Canada*	*Other*
1950	48	----------	43	5
1955	166	18	138	10
1960	266	99	151	17
1965	1,193	804	353	35
1970	2,753	2,377	292	84
1971	2,292	1,847	343	102
1972	[1]3,143	2,530	519	95

[1] Equivalent to about 4.1 billion board feet, lumber tally, and 3.9 billion board feet, International ¼-inch log rule.

Nearly all of the recent increase in log exports was composed of softwood logs produced in western Washington, western Oregon, and northern California. The rapid growth in these exports was a result of large increases in demand in Japan—the destination of 96 percent of recent softwood log shipments. As indicated in Chapter IV, Japanese demands for wood are expected to continue to grow and continuing pressures to increase log imports can be expected.

Part of increased Japanese timber demands in the next couple of decades could be met from the softwood forests of Siberia and from other sources such as New Zealand and tropical regions. Canada can be expected to supply larger quantities of softwood lumber to Japan but no significant exports of softwood logs since the export of logs from that country is controlled.

Although part of the Japanese import demand can be met from these sources, continuing growth in Japanese demand for logs from the Pacific Coast is likely, at least during the next two decades. However, the tightening timber supply situation in the United States is expected to eventually result in restrictions on log exports. It has, therefore, been assumed that softwood log exports would not exceed 4.5 billion board feet annually (International ¼-inch log rule).

Hardwood log exports have not been large—94 million board feet in 1972, for example—but these exports have consisted for the most part of scarce and highly valuable species like walnut. No significant change in such exports is projected.

Log imports in 1972 were 39 million board feet, log scale. This was materially below imports of over 200 million feet a year in the early 1950's and the annual average of about 100 million board feet in recent years. Over half of these log imports originated in Canada and consisted chiefly of softwood logs for pulp and lumber. Most other log imports were tropical hardwoods for manufacture of veneer. Not much change from the level of log imports in the 1960's is expected during the projection period.

SUMMARY OF DEMAND FOR TIMBER

The projections of demand for timber products presented above have been in standard units of measure, that is, board feet of lumber, square feet of plywood, cords of pulpwood and fuelwood, and cubic feet of miscellaneous industrial roundwood products. In this section these projections are converted to common units of measure—cubic feet of roundwood and board feet of sawtimber. After allowances for exports and imports, these figures provide a measure of demand upon domestic timber resources which are comparable to the projections of domestic timber supplies shown in Chapters II and III.

Improvements in Utilization

An important factor in converting demands for timber products to roundwood is the prospective change in utilization practices. During the past couple of decades there have been substantial improvements in utilizing the timber harvested. This is illustrated in figure 76 which shows that during the period 1950–72 the tonnage of timber products consumed—lumber, plywood, woodpulp, etc.—increased 51 percent, while the cubic volume of roundwood utilized increased only 38 percent (Append. V, tables 29 and 30).

Consumption of industrial wood

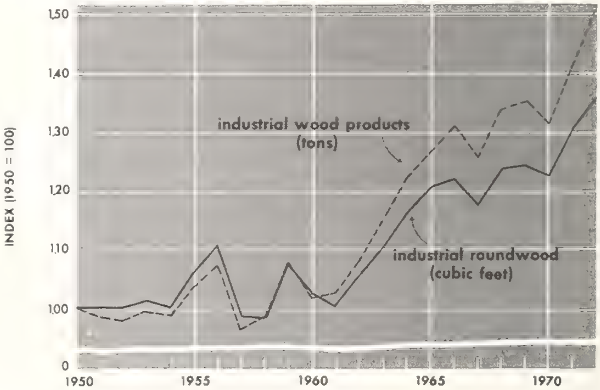

Figure 76

Improvements in utilization have largely involved the growing use of slabs, edgings, sawdust, veneer cores, shavings, and other similar material for pulp and particleboard. Various technological changes have also led to increased product yield per unit of wood input although in the lumber industry this has apparently been offset by the use of smaller and lower quality material and the spreading use of chipping headrigs. Yields in the pulp industry have also been held down by a sharp rise in the production of bleached and semibleached pulps.

In converting projected demands for lumber, plywood, and pulpwood to roundwood and sawtimber volumes, technological developments affecting product yields, and other factors such as changes in standards and prospective changes in the size and quality of timber, have been taken into account. For example, projected demands for softwood lumber have been converted to demands for sawtimber and roundwood with an allowance for new softwood lumber standards that became effective in September 1970. These standards specify reduced thicknesses and widths of most sizes of softwood lumber, with an estimated average increase in lumber yields of approximately 5 percent per thousand board feet of logs, International ¼-inch log rule.[47]

In addition to this adjustment, it was assumed that various other technological developments to be expected with 1970 levels of research and development, and prospective rates of adoption of new technology by the forest industries, would lead to increases in product output per unit of log input.

The growing use of thin-kerf high-strain bandsaws and thin-kerf circular saws is an example of technological developments affecting lumber yields.[48] An estimated 22 percent of saw-log volumes has typically been converted into sawdust, and reduction of saw kerf from improvements in milling equipment and quality control could result in significant increases in lumber yields.

Another example of new technology is represented by the "Best Opening Face" system that uses automated headrig control by a minicomputer to locate precisely the best initial cut to maximize lumber yields.[49] Calculations indicate that this BOF system, if universally applied, could increase lumber yields by an estimated average of 10 percent.

Potential technological developments also include production of laminated lumber. This product is made by gluing together sliced sheets of veneer up to one-half inch in thickness and subsequently sawing these into structural lumber, pallet stock, or other products. Preliminary work indicates that product yields might be substantially increased by this process.[50] A somewhat related system of producing sawn products involves live sawing logs into 2-inch strips, positioning these strips to minimize effects of defects, edge-gluing them into wide panels, and ripping the panels into desired widths of dimension lumber.

The chipping headrig is a further example of new technology now coming into wide use for joint production of lumber and pulp chips.[51] Although lumber yields are relatively low, this equipment makes possible the profitable conversion of small logs into lumber and chips for pulping.

The rate of development, acceptance, and application of new technology such as illustrated above is necessarily highly uncertain. The financing and effectiveness of research efforts will determine how rapidly new discoveries are made. Educational efforts will determine how rapidly new discoveries are made known. The attitude and financial resources of forest industries will determine how rapidly new technology will be adopted.

New technologies that promise to produce an existing product more efficiently or save on use of raw material may or may not be promptly put into use by the forest industries, depending on such factors as price-cost relationships, consumer acceptance, or institutional obstacles. Wood particleboard, for instance, was patented in 1905 but large-scale commercial production did not get underway until a half century later.

Adoption of new technology will also be influenced by the availability of capital to the forest industries for modernization of plant and equipment and for changes in market strategy. The trend toward larger and more integrated firms in timber industries could be of help in obtaining financing for more rapid adoption of new technology than in the past.

Based on consideration of the above factors, 1970 levels of research and development, prospective rates of adoption of new technology, and projected changes in the size and quality of timber available, it has been assumed that there would be significant increases in timber product yields over the projection period. The assumed increases from the 1970 base for lumber are shown in the tabulation below:

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[47] National Forest Products Association. Evaluation of ASTM standards to develop "E" values for structural lumber. Washington, D.C. 1970.

[48] Mason, H. C. Wood industry technology: what's new now, what's to come. Forest Industries 98(11):22–24. 1971.

[49] Hallock, Hiram, and David W. Lewis. Increasing softwood dimension yield from small logs. USDA Forest Serv., Res. Pap. FPL–166, 12 p. 1971.

[50] Bohlen, J. C. LVL—Laminated veneer lumber—development and economics. Forest Prod. J. 22(1):18–26. 1972.

[51] Koch, Peter. Technological developments in the southern pine industry. Forest Farmer 30(7):16–20. 1971.

Relative price assumptions	Percent increase in lumber yields per thousand board feet of logs, International ¼-inch log rule					
	Softwoods			*Hardwoods*		
	1980	*1990*	*2000*	*1980*	*1990*	*2000*
1970 relative prices	[1] 7	10	12	2	3	4
Rising relative prices	[1] 8	12	15	3	4	5
Relative prices 30 percent above 1970	[1] 11	12	13	4	4	4

[1] Includes a 5 percent increase resulting from the change in lumber standards in 1970.

It was assumed that plywood yields would also increase by roughly the same amounts.

As indicated in the above tabulation, higher relative prices of timber products would be expected to accelerate improvements in utilization because of competition for timber and increased capability of manufacturers to finance new plant and equipment.

Pulp yields, as indicated in the section on pulpwood, have been projected to rise about 7 percent over the 30-year projection period in response to expected increases in the use of hardwoods and technological developments. It was also estimated that use of plant residues and wastepaper would approach the limits imposed by the amounts of such material economically and physically available.

With more rapid advances in development and adoption of new technology, increases in product yields from available timber could, of course, be higher than estimated for these projections.

Recent Trends in Roundwood Consumption

In 1970 total U.S. consumption of timber products in terms of roundwood volume was 12.7 billion cubic feet (table 150; Append. V, tables 30–32).[52] Roundwood consumption rose to 14.2 billion cubic feet in 1972, a peak in a trend that has risen from around 11 billion cubic feet in the early 1960's. Roundwood consumption in 1972 was also materially above the levels attained in the early 1900's when lumber use was at an all-time high and record volumes of fuelwood were consumed.

A little over half of the roundwood consumed in 1972 consisted of saw logs used for lumber. About a third was used for pulp products. Eleven percent was used for veneer and plywood. The remaining 7 percent was about equally divided between miscellaneous industrial products and fuelwood.

In the years from 1950 to 1972 there was a 16 percent rise in the volume of roundwood used for lumber. Use of roundwood nearly doubled for pulp products, and quadrupled for veneer and plywood.

Use of roundwood for miscellaneous industrial products and fuelwood declined during the 1950's and most of the 1960's. It has been assumed, however, that the decline in consumption of these products has bottomed out.

Projected demand for Roundwood

Projected roundwood demands are materially affected by the assumptions on population and economic activity specified in the introductory section of this chapter. The range in projected total demand for roundwood in 2000, for example, at 1970 prices is from 19.5 billion to 27.1 billion cubic feet (fig. 77).

The medium projection of demand reaches 16.4 billion cubic feet in 1980, with a continuing rise to 22.8 billion cubic feet in 2000—some 1.6 times consumption in 1972. Most of the projected growth in demand is for pulp products, and pulpwood consequently accounts for nearly half of the total demand for roundwood in 2000.

Projected demands are also materially affected by the alternative price assumptions specified earlier. For example, the medium projections of demand by 2000 ranges between 22.8 billion cubic feet at 1970 price levels and 19.2 billion cubic feet with rising relative prices (that is, 1.5 percent per year for lumber; 1.0 percent for plywood, miscellaneous products and fuelwood; and 0.5 percent for paper and board). Nearly all of the growth in demand under the latter price assumption would be for pulpwood.

With lumber and plywood prices 30 percent above the 1970 average, miscellaneous products and fuelwood up 15 percent, and paper and board prices 10 percent higher, the medium projection of demand rises relatively slowly in the 1970's,

Roundwood consumption 1950-72, with projected demand under alternative assumptions to 2000

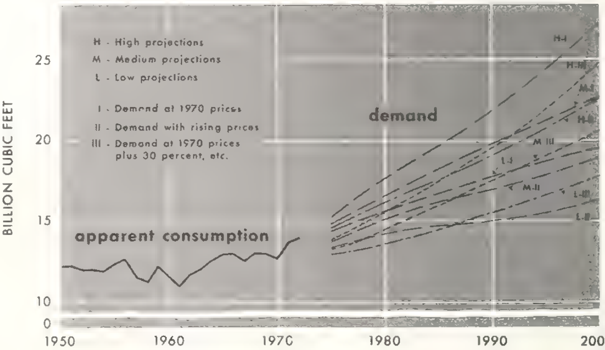

Figure 77

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[52] Roundwood is derived both from the "growing stock" component of the forest (that is, live trees on commercial timberlands above 5.0 inches in diameter meeting certain standards of soundness and quality) and from other sources such as cull and dead trees and trees on noncommercial and nonforest lands. Projected supplies of roundwood from these sources are shown in Chapters II and III.

TABLE 150.—*Summary of roundwood consumption by species group and major product, 1952, 1962, and 1970, with projections of demand (medium level [1]) under alternative price assumptions to 2000*

[Billion cubic feet, roundwood equivalent]

Species group and product	1952	1962	1970	Projections								
				1970 relative prices			Rising relative prices [2]			Relative prices above 1970 averages [3]		
				1980	1990	2000	1980	1990	2000	1980	1990	2000
SOFTWOODS												
Saw logs	5.0	4.8	5.0	6.1	6.7	7.0	5.3	5.3	5.0	5.0	5.6	5.9
Veneer logs	.2	.6	.9	1.4	1.7	1.9	1.3	1.4	1.5	1.2	1.4	1.5
Pulpwood [4]	2.4	2.6	3.4	4.2	5.3	6.5	4.2	5.4	6.7	4.2	5.4	6.6
Miscellaneous products [5]	.3	.3	.2	.3	.3	.3	.3	.2	.2	.2	.2	.2
Fuelwood	.5	.2	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
Total [6]	8.4	8.5	9.7	12.1	14.1	15.8	11.2	12.4	13.5	10.7	12.7	14.3
HARDWOODS												
Saw logs	1.1	1.0	1.1	1.5	1.8	2.0	1.3	1.4	1.4	1.2	1.5	1.7
Veneer logs	.2	.2	.3	.4	.4	.5	.3	.3	.4	.4	.4	.5
Pulpwood [4]	.3	.7	1.0	1.8	2.7	3.9	1.8	2.4	3.4	1.7	2.4	3.6
Miscellaneous products [5]	.4	.2	.2	.2	.2	.2	.2	.2	.1	.2	.2	.2
Fuelwood	1.5	.9	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4
Total [6]	3.5	3.1	3.0	4.3	5.5	7.0	4.0	4.7	5.7	3.9	4.9	6.4
ALL SPECIES												
Saw logs	6.1	5.7	6.1	7.6	8.5	9.0	6.6	6.7	6.4	6.2	7.1	7.6
Veneer logs	.4	.9	1.2	1.8	2.1	2.4	1.6	1.7	1.9	1.6	1.8	2.0
Pulpwood [4]	2.7	3.3	4.4	6.0	8.0	10.4	6.0	7.8	10.1	5.9	7.8	10.2
Miscellaneous products [5]	.7	.5	.4	.5	.5	.5	.5	.4	.3	.4	.4	.4
Fuelwood	2.0	1.1	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
Total [6]	11.9	11.6	12.7	16.4	19.6	22.8	15.2	17.1	19.2	14.6	17.6	20.7

[1] Based on the medium projections of growth in population and economic activity shown in the introductory section of this chapter.

[2] Relative prices rising from 1970 trend levels as follows: lumber—1.5 percent per year; plywood, miscellaneous products, and fuelwood—1.0 percent per year; paper and board—0.5 percent per year.

[3] Relative prices of lumber and plywood—30 percent, miscellaneous products and fuelwood—15 percent, and paper and board—10 percent, above the 1970 averages.

[4] Includes both pulpwood and the pulpwood equivalent of the net imports of woodpulp, paper, and board.

[5] Includes cooperage logs, poles, piling, fence posts, hewn ties, round mine timbers, box bolts, excelsior bolts, chemical wood, shingle bolts, and other miscellaneous items.

[6] Includes imported logs not shown by major product use.

Note: Data may not add to totals because of rounding.

Sources: 1952, 1962, and 1970—Based on data published by the U.S. Departments of Commerce and Agriculture.

Projections: U.S. Department of Agriculture, Forest Service.

but fairly rapidly thereafter to over 20 billion cubic feet in 2000. Under this price assumption the demand for saw logs does not change in the 1970's. By the 1980's however, projected demands for saw logs rise along with growing demands for veneer logs and pulpwood in response to growth in population and economic activity.

Projected Demand by Species Groups

Growth in roundwood consumption in the 1950–71 period consisted entirely of timber produced from softwood species (Append. V, tables 30–32). Consumption of hardwood roundwood declined with a drop in use of miscellaneous industrial timber products and fuelwood. However, this trend was reversed in 1972 largely in response to increased use of lumber in furniture and pallet manufacture.

Projections show rather large increases for both softwoods and hardwoods. Assuming 1970 relative prices, for example, the medium projection of demand for softwoods increases about

63 percent by 2000—from 9.7 to 15.8 billion cubic feet. Demand for hardwoods is projected to rise about 133 percent from 3.0 to 7.0 billion cubic feet. The faster rate of growth in demand for hardwoods, and the reversal of the downward trend of recent years, largely reflects the projected rise in demand for hardwood roundwood for pulp products, hardwood lumber for pallets, and hardwood plywood and veneer for furniture manufacture.

Projected Demand for Sawtimber

About 70 percent of the roundwood consumed in 1970 came from the saw-log portion of sawtimber trees (See Append. II). Trends in consumption of sawtimber in the past couple of decades have been very similar to the trends for total roundwood, that is not much rise in the 1950's but a fairly rapid upward movement in the 1960's and early 1970's (table 151, fig. 78; Append. V, tables 33–35).

With 1970 relative prices, projected demand (medium level) for softwood sawtimber rises from 47.6 billion board feet in 1970 to 72.6 billion board feet in 2000—an increase of 53 percent.

Projected demand for hardwood sawtimber (medium level—1970 prices) also moves up from 12.3 billion board feet in 1970 to 24.3 billion feet by 2000, an increase of nearly 100 percent.

The alternative assumptions on population and economic activity result in a substantial range in projected demand for sawtimber. By 2000, projected demands at 1970 prices vary from about 63 billion to 84 billion board feet—levels that are respectively 13 percent below and 16 percent above the medium level.

Since most sawtimber is used for lumber and plywood, where demand is relatively responsive to price changes, projected demands under higher price assumptions are materially lower than with the 1970 price assumptions.

Thus, with rising prices (that is, with lumber prices rising at 1.5 percent, plywood prices rising by 1.0 percent, and paper and board prices rising by 0.5 percent) the medium projection of demand for softwood sawtimber in 2000 amounts to about 55 billion board feet—some 16 percent above 1970, but 24 percent below the projected level with 1970 relative prices.

Projected hardwood sawtimber demand in 2000, under this rising price assumption, totals 19.1 billion board feet—55 percent above 1970.

With prices of softwood lumber and plywood 30 percent above the 1970 average, paper and board prices 10 percent and other products 15 percent higher, projected demand for softwood sawtimber reaches 61.9 billion board feet by 2000, and hardwood sawtimber about 21 billion board feet.

Sawtimber consumption, 1950 -72 with projected demand (medium level) to 2000 under alternative price assumptions

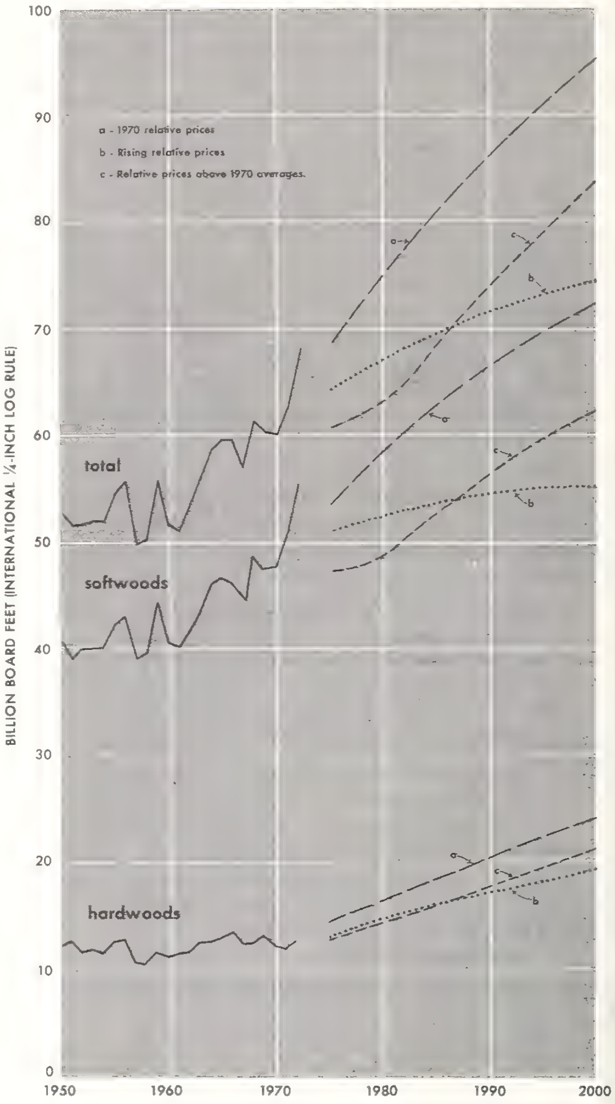


Figure 78

Projected Export Demand

The roundwood equivalent of exports of timber products—lumber, pulp products, logs, etc.—increased from 0.1 billion cubic feet in 1950 to 1.4 billion cubic feet in 1970 (table 152, fig. 79; Append. V, tables 30–32). Most of the increase in exports in these two decades was for logs and pulp products produced mainly from softwood timber.

Estimated volumes of sawtimber used for exported products also showed a large increase

TABLE 151.—*Summary of sawtimber consumption by species group and major product, 1952, 1962, and 1970, with projections of demand (medium level* [1]*) under alternative price assumptions to 2000*

[Billion board feet, International ¼-inch log rule]

Species group and product	1952	1962	1970	Projections								
				1970 relative prices			Rising relative prices [2]			Relative prices above 1970 averages [3]		
				1980	1990	2000	1980	1990	2000	1980	1990	2000
SOFTWOODS												
Saw logs	31. 8	30. 8	31. 6	38. 5	42. 2	43. 9	33. 3	33. 1	31. 4	31. 5	35. 1	37. 1
Veneer logs	1. 9	4. 9	6. 8	10. 0	11. 5	13. 0	8. 9	9. 8	10. 0	8. 1	9. 4	10. 6
Pulpwood	4. 3	5. 0	8. 0	9. 2	11. 6	14. 5	8. 2	10. 1	12. 6	8. 0	10. 2	13. 1
Miscellaneous products [4]	1. 2	. 9	1. 0	1. 0	1. 0	1. 0	. 9	. 9	. 8	. 9	. 9	. 9
Fuelwood	. 6	. 1	. 1	. 1	. 1	. 1	. 1	. 1	. 1	. 1	. 1	. 1
Total [5]	39. 9	41. 7	47. 6	58. 9	66. 5	72. 6	51. 5	54. 1	55. 0	48. 7	55. 8	61. 9
HARDWOODS												
Saw logs	7. 1	6. 5	7. 3	8. 9	10. 6	11. 8	7. 7	8. 4	8. 6	7. 4	9. 0	10. 1
Veneer logs	1. 1	1. 6	1. 8	2. 5	3. 1	3. 5	2. 2	2. 5	2. 6	2. 1	2. 5	2. 7
Pulpwood	. 4	2. 2	2. 2	3. 8	5. 5	7. 9	3. 5	4. 8	6. 9	3. 4	4. 8	7. 2
Miscellaneous products [4]	1. 2	. 6	. 7	. 7	. 7	. 7	. 7	. 6	. 6	. 7	. 7	. 7
Fuelwood	1. 7	. 7	. 3	. 3	. 3	. 3	. 3	. 3	. 3	. 3	. 3	. 3
Total [5]	11. 6	11. 7	12. 3	16. 3	20. 3	24. 3	14. 5	16. 7	19. 1	14. 0	17. 4	21. 1
ALL SPECIES												
Saw logs	39. 0	37. 2	38. 9	47. 4	52. 8	55. 7	41. 0	41. 5	40. 0	38. 9	44. 1	47. 2
Veneer logs	3. 0	6. 5	8. 6	12. 5	14. 6	16. 5	11. 1	12. 3	12. 6	10. 2	11. 9	13. 3
Pulpwood	4. 7	7. 2	10. 2	13. 0	17. 1	22. 4	11. 7	14. 9	19. 5	11. 4	15. 0	20. 3
Miscellaneous products [4]	2. 4	1. 5	1. 7	1. 7	1. 7	1. 7	1. 6	1. 5	1. 4	1. 6	1. 6	1. 6
Fuelwood	2. 3	. 8	. 4	. 4	. 4	. 4	. 4	. 4	. 4	. 4	. 4	. 4
Total [5]	51. 6	53. 3	59. 9	75. 2	86. 8	96. 9	66. 0	70. 8	74. 1	62. 7	73. 2	83. 0

[1] Based on the medium projections of growth in population and economic activity shown in the introductory section of this chapter.

[2] Relative prices rising from 1970 trend levels as follows: lumber—1.5 percent per year; plywood, miscellaneous product, and fuelwood—1.0 percent per year; paper and board—0.5 percent per year.

[3] Relative prices of lumber and plywood—30 percent, miscellaneous products and fuelwood—15 percent, and paper and board—10 percent, above the 1970 averages.

[4] Includes cooperage logs, poles, piling, fence posts, hewn ties, round mine timbers, box bolts, excelsior bolts, chemical wood, shingle bolts, and other miscellaneous items.

[5] Includes imported logs not shown by major product use.

Note: Data may not add to totals because of rounding.

Sources: 1952, 1962, and 1970—Based on data published by the U.S. Departments of Commerce and Agriculture.

Projections: U.S. Department of Agriculture, Forest Service.

between 1950 and 1970, from 0.7 to 4.7 billion board feet (table 153; Append. V, tables 33–35).

Under the assumptions discussed above, projected exports in terms of roundwood rise to 1.8 billion cubic feet in 2000, some 29 percent above the volume shipped in 1970. Projected sawtimber exports show about the same trends as roundwood.

Projected Imports

Total imports of timber products rose from 1.4 billion cubic feet roundwood equivalent in 1950 to 2.4 billion cubic feet in 1970 and to 2.9 billion in 1972 (table 152, fig. 79; Append. V, tables 30–33). Most of these increased imports consisted of softwood lumber and pulp products from Canada.

With 1970 relative prices, projected imports amount to 2.7 billion cubic feet of roundwood equivalent by 1980 (medium projection) and remain at this level through the projection period. With higher prices covering the costs of developing unused softwood resources in northern parts of Canada, projected imports approximate 4.6 billion cubic feet by 2000—nearly double the 1970 level (fig. 79).

TABLE 152.—*Summary of roundwood consumption, exports, imports, and production from U.S. forests, 1952, 1962, and 1970, with projections (medium level [1]) under alternative price assumptions to 2000*

[Billion cubic feet, roundwood equivalent]

Item	1952	1962	1970	Projections								
				1970 relative prices			Rising relative prices [2]			Relative prices above 1970 averages [3]		
				1980	1990	2000	1980	1990	2000	1980	1990	2000
SOFTWOODS												
U.S. consumption	8. 4	8. 5	9. 7	12. 1	14. 1	15. 8	11. 2	12. 4	13. 5	10. 7	12. 7	14. 3
Exports	. 2	. 4	1. 2	1. 7	1. 6	1. 6	1. 7	1. 6	1. 6	1. 7	1. 6	1. 6
Imports	1. 3	1. 7	2. 1	2. 3	2. 3	2. 3	3. 1	3. 7	4. 0	3. 2	3. 6	3. 7
Production from U.S. forests [5]	7. 3	7. 2	8. 8	11. 5	13. 4	15. 1	9. 8	10. 3	11. 1	9. 2	10. 7	12. 2
HARDWOODS												
U.S. consumption	3. 5	3. 1	3. 0	4. 3	5. 5	7. 0	4. 0	4. 7	5. 7	3. 9	4. 9	6. 4
Exports	(4)	. 1	. 2	. 2	. 2	. 2	. 2	. 2	. 2	. 2	. 2	. 2
Imports	. 1	. 2	. 3	. 4	. 4	. 4	. 5	. 5	. 6	. 6	. 6	. 6
Production from U.S. forests [5]	3. 5	3. 0	2. 9	4. 1	5. 3	6. 8	3. 7	4. 4	5. 3	3. 5	4. 5	6. 0
ALL SPECIES												
U.S. consumption	11. 9	11. 6	12. 7	16. 4	19. 6	22. 8	15. 2	17. 1	19. 2	14. 6	17. 6	20. 7
Exports	. 2	. 5	1. 4	1. 9	1. 8	1. 8	1. 9	1. 8	1. 8	1. 9	1. 8	1. 8
Imports	1. 4	1. 9	2. 4	2. 7	2. 7	2. 7	3. 6	4. 2	4. 6	3. 8	4. 2	4. 3
Production from U.S. forests [5]	10. 8	10. 2	11. 7	15. 6	18. 7	21. 9	13. 5	14. 7	16. 4	12. 7	15. 2	18. 2

[1] Based on the medium projections of growth in population and economic activity shown in the introductory section of this chapter.

[2] Relative prices rising from 1970 trend level as follows: lumber—1.5 percent per year; plywood, miscellaneous products, and fuelwood—1.0 percent per year; paper and board—0.5 percent per year.

[3] Relative prices of lumber and plywood—30 percent, miscellaneous products and fuelwood—15 percent, and paper and board—10 percent above the 1970 averages.

[4] Less than 50 million cubic feet.

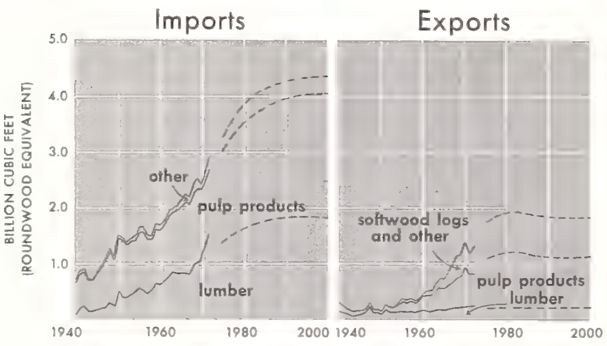
[5] The data for 1952, 1962, and 1970 are estimates of actual harvests and are not directly comparable with the trend level estimates of supply shown in Chapter II.

Note: Data may not add to totals because of rounding.

Sources: 1952–70—Based on data published by the U.S. Departments of Commerce and Agriculture.

Projections: U.S. Department of Agriculture, Forest Service.

Imports and exports of timber products, 1940-72, with projections* to 2000



* Relative prices 30 percent above 1970 average for lumber, etc.

Figure 79

Projected imports in terms of sawtimber follow about the same trend as total roundwood, that is, show comparatively little change with 1970 relative prices but substantial increases under the higher assumptions.

Projected Net Imports

Between 1950 and 1970 growth in imports roughly equalled the rise in exports; as a result, net annual imports remained fairly stable at about 1.3 billion cubic feet and composed about 11 percent of consumption. Net imports rose to a peak of 1.6 billion cubic feet in 1972, but remain at about 11 percent of U.S. consumption.

Net imports of products derived from sawtimber increased from around 2 billion board feet in the early 1950's to over 4 billion feet in the early 1970's. Most of this growth reflected the sharp rise

TABLE 153.—*Summary of sawtimber consumption, exports, imports, and production from U.S. forests, 1952, 1962, and 1970, with projections (medium level* [1]*) under alternative price assumptions to 2000*

[Billion board feet, International ¼-inch log rule]

Item	1952	1962	1970	Projections								
				1970 relative prices			Rising relative prices [2]			Relative prices above 1970 averages [3]		
				1980	1990	2000	1980	1990	2000	1980	1990	2000
SOFTWOODS												
U.S. consumption	39.9	41.7	47.6	58.9	66.5	72.6	51.5	54.1	55.0	48.7	55.8	61.9
Exports	.7	1.2	4.6	5.6	5.6	5.6	5.6	5.6	5.5	5.6	5.6	5.6
Imports	2.4	4.6	5.9	6.6	6.5	6.4	8.9	10.8	11.4	9.6	10.8	10.8
Production form U.S. forests [4]	38.2	38.3	46.2	57.9	65.6	71.8	48.2	48.9	49.1	44.7	50.6	56.7
HARDWOODS												
U.S. consumption	11.6	11.7	12.3	16.3	20.3	24.3	14.5	16.7	19.1	14.0	17.4	21.1
Exports	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
Imports	.3	1.0	1.3	2.0	2.0	2.0	2.0	2.3	2.7	2.4	2.4	2.4
Production from U.S. forests [4]	11.5	10.9	11.2	14.5	18.5	22.5	12.7	14.6	16.6	11.8	15.2	18.9
ALL SPECIES												
U.S. consumption	51.6	53.3	59.9	75.2	86.8	96.9	66.0	70.8	74.1	62.7	73.2	83.0
Exports	.7	1.4	4.7	5.8	5.8	5.8	5.8	5.8	5.7	5.8	5.8	5.8
Imports	2.7	5.6	7.3	8.6	8.5	8.4	10.9	13.1	14.1	12.0	13.2	13.2
Production from U.S. forests [4]	49.6	49.1	57.3	72.4	84.1	94.3	60.9	63.5	65.7	56.5	65.8	75.6

[1] Based on the medium projections of growth in population and economic activity shown in the introductory section of this chapter.

[2] Relative prices rising from 1970 trend level as follows: lumber—1.5 percent per year; plywood, miscellaneous products, and fuelwood—1.0 percent per year; paper and board—0.5 percent per year.

[3] Relative prices of lumber and plywood—30 percent, miscellaneous products and fuelwood—15 percent, and paper and board—10 percent, above the 1970 averages.

[4] The data for 1952, 1962, and 1970 are estimates of actual harvests and are not directly comparable with the trend level estimates of supply shown in Chapter II.

Note: Data may not add to totals because of rounding.

Sources: 1952–70—Based on data published by the U.S. Departments of Commerce and Agriculture.

Projections: U.S. Department of Agriculture, Forest Service.

in imports of softwood lumber and hardwood plywood.

Projected net imports of timber products increase moderately under the higher price assumptions. But net imports under all price assumptions remain comparatively small in relation to total U.S. demands for timber products. Thus, it seems evident that the Nation must continue to depend largely on domestic forests to supply future timber markets.

Projected Demand for Roundwood From U.S. Forests

Production of softwood roundwood from U.S. forests showed little change in the 1950's but a fairly fast increase in the 1960's (table 152; Append. V, tables 30–32). Production of sawtimber from U.S. forests followed similar trends (table 153; Append. V, tables 33–35).

In contrast, production of hardwood—roundwood and sawtimber—showed a slight downward trend during both decades.

Projected demand for timber from U.S. forests—medium level and 1970 prices—rises from 11.7 billion cubic feet in 1970 to 21.9 billion cubic feet by 2000—a rise of 87 percent. Associated demands for sawtimber rise from 57.3 to 94.3 billion board feet. Most of the projected increases in demand is for softwoods. However, projected demand for hardwoods rises sharply—roughly doubling by 2000.

As in the case of total demand, use of alternative economic and price assumptions has substantial impacts on projected demands for timber from U.S. forests. With relative prices 30 percent above the 1970 averages, for example, projected demands on U.S. forests by 2000 reach 18.2 billion cubic feet, including 75.6 billion board feet of sawtimber. These volumes are 56 percent and 32 percent, respectively, above 1970 production levels.

Because of differences in the size of the assumed price increases by product, and differences in the sensitivity of demand for each product to rising prices, the impact of higher prices is primarily on demands for sawtimber products. For example, under the rising price assumption (1.5 percent per year for lumber; 1.0 percent for plywood, miscellaneous products, and fuelwood; and 0.5 percent for paper and board) demands for domestic sawtimber in 2000 would be 65.7 billion board feet—about 15 percent above production in 1970. In contrast, projected demands for softwood roundwood rise by about 40 percent, largely because of increases in demand for pulpwood.

Although there are differences in the magnitudes of the increases, all projections indicate substantially larger demands on U.S. forests. There are fundamental questions as to the ability of U.S. forests to supply projected demands and the size of price increases necessary to bring demands into equilibrium with supplies. These questions are considered in the following chapter.

DEMAND FOR INDUSTRIAL TIMBER PRODUCTS IN RELATION TO OTHER INDUSTRIAL RAW MATERIALS

Timber is one of the basic industrial raw materials used in the U.S. economy. An analysis of prospective demands for other materials is of interest in judging the validity of timber demand projections and of likely changes in the relative importance of the major industrial raw materials. Mineral products, including metals, sand, gravel, and cement, are of special importance in this connection. Some competition also exists between timber products and other agricultural and related products such as fibers and rubber.

Between 1900 and 1969 consumption of all industrial raw materials increased from $4.5 billion (1967 dollars) to $17.1 billion (Append. V, table 36). Per capita use of materials in 1967 dollars rose from around $50 to about $85.

Annual rates of growth in use of industrial raw materials in these seven decades averaged about 2 percent per year—substantially below the rate of increase in the gross national product. This differential resulted from such factors as refinements in manufacturing that added more value to given amounts of raw materials; more complete utilization of raw materials; increased recycling of scrap and used materials; and relative increases in the transportation, trade, and service components of the gross national product.

During the first 5 decades of this century, there were some substantial shifts in the relative importance of various industrial raw materials (fig. 80). Industrial timber products declined in relative importance, falling from about 45 percent of all industrial raw materials consumed in 1900 to around 20 percent in 1950 while minerals showed an offsetting increase. Since the mid-1950's, there has been little change in the composition of the raw materials used.

Relative importance of industrial raw materials

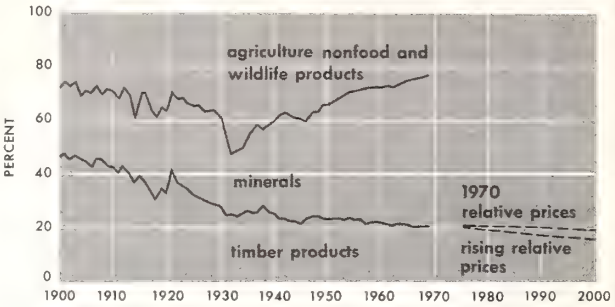


Figure 80

The decline in relative importance of industrial timber products before 1950 was presumably related to the fact that prices of most timber products showed substantial increases relative to the general price level and relative to prices of minerals and farm products.[53] On the other hand, there was little change in timber product prices relative to the general price level and to most competing materials between 1950 and 1967.

There has been a close statistical relationship between changes in the consumption of industrial raw materials and changes in the gross national product in the past two decades. Projections based on this relationship indicate that demand (medium level) for industrial raw materials may reach $30.8 billion (1967 dollars) by 2000 (table 154). Rates of increase in this projection are about the same as projected rates of increase in demand for industrial roundwood at 1970 relative prices, as shown by the following tabulation of annual rates of increase.

Period	*All industrial raw materials*	*Timber products*		
		1970 relative prices	*Rising relative prices* [1]	*Higher relative prices* [2]
1940–69	[3] 2.4	[3] 1.6	------	------
1969–2000	------	1.9	1.3	1.6

[1] With relative prices rising at 1.5 percent per year for lumber, 1.0 percent for plywood and miscellaneous products, and 0.5 percent for paper and board.

[2] With relative prices of lumber and plywood 30 percent, miscellaneous products 15 percent, and paper and board 10 percent above the 1970 averages.

[3] Increase with actual prices.

A rise in relative prices of timber products, however, could be expected to reduce growth rates for timber products and shift demands to other industrial raw materials.

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[53] See Fisher, Joseph F., and Neal Potter. World prospects for national resources. The Johns Hopkins Press, Baltimore, Maryland. 1964.

Table 154.—*Consumption of industrial raw materials in the U.S. by broad product groups, selected years 1920–69, with projections of demand to 2000*

[Billions of 1967 dollars]

Year	All industrial raw materials	Industrial timber products [1]	Nonwood materials		
			Total	Minerals except fuels [2]	Agriculture and fishery nonfoods and wildlife products [3]
1920	7. 01	2. 27	4. 74	2. 11	2. 63
1925	7. 91	2. 49	5. 42	2. 61	2. 81
1930	6. 99	1. 93	5. 06	2. 32	2. 74
1935	6. 10	1. 58	4. 52	1. 62	2. 90
1940	8. 66	2. 14	6. 52	2. 94	3. 58
1945	10. 14	2. 09	8. 05	3. 99	4. 06
1950	12. 48	2. 81	9. 67	5. 30	4. 37
1955	13. 25	2. 95	10. 30	6. 37	3. 93
1960	13. 47	2. 83	10. 64	6. 83	3. 81
1965	16. 40	3. 36	13. 04	8. 82	4. 22
1966	17. 10	3. 39	13. 71	9. 35	4. 36
1967	16. 45	3. 22	13. 23	9. 14	4. 09
1968	17. 16	3. 40	13. 76	9. 57	4. 19
1969	17. 14	3. 40	13. 74	9. 71	4. 03
Projections—1970 relative prices					
1980	22. 18	4. 40	17. 58	13. 78	4. 00
1990	26. 62	5. 28	21. 06	17. 34	4. 00
2000	30. 80	6. 11	24. 60	20. 69	4. 00
Projections—rising relative prices [4]					
1980	22. 18	4. 01	18. 17	14. 17	4. 00
1990	26. 62	4. 53	22. 09	18. 09	4. 00
2000	30. 80	5. 06	25. 74	21. 74	4. 00
Projections—relative prices above 1970 average [5]					
1980	22. 18	3. 84	18. 34	14. 34	4. 00
1990	26. 62	4. 67	21. 95	17. 95	4. 00
2000	30. 80	5. 56	25. 24	21. 24	4. 00

[1] Includes saw logs; veneer logs; pulpwood; and miscellaneous products, such as poles, piling, and posts.

[2] Includes mineral construction materials, such as dimension stone, crushed and broken stone, sand and gravel, fire clay, common clay and shale, gypsum, and other similar construction materials; metal ores; chemical and fertilizer minerals; abrasives and other minerals.

[3] Includes cotton and other fiber, oils, rubber, furs, hides, and other similar products.

[4] With relative prices of timber products rising from 1970 trend levels as follows: lumber—1.5 percent per year; plywood and miscellaneous products—1.0 percent per year; paper and board—0.5 percent paper year.

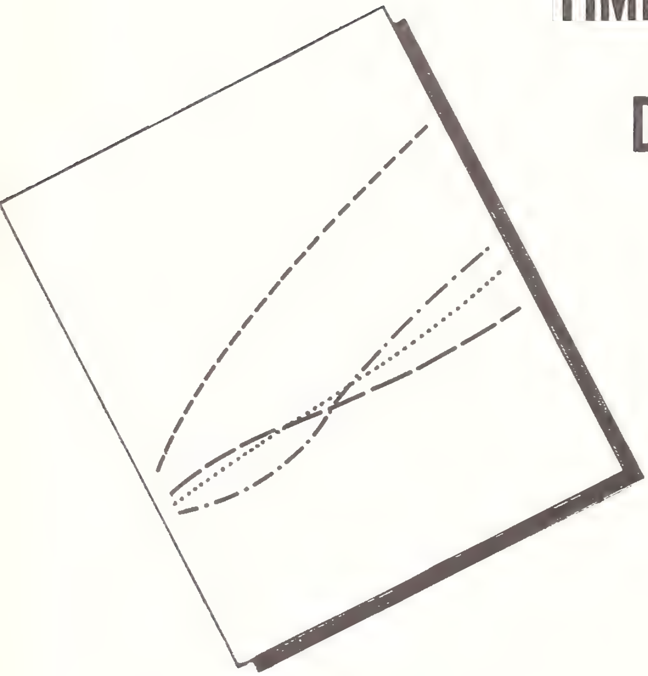
[5] With relative prices of lumber and plywood 30 percent, miscellaneous products 15 percent, and paper and board 10 percent above the 1970 averages.

Source: 1920–69—U.S. Department of Commerce, Bureau of the Census, and U.S. Department of the Interior, Bureau of the Mines. *Raw material in the United States economy; 1900–1969.* Working Paper 35. 1972.

Projections: U.S. Department of Agriculture, Forest Service.

CHAPTER VI

TIMBER DEMAND/SUPPLY RELATIONSHIPS



This chapter presents comparisons of (1) projected demands for timber in the United States under alternative price assumptions and (2) projected timber supplies under alternative prices and levels of forest management. Some implications of these comparisons in terms of possible price trends and impacts on the major timber industries also are included. Finally, mention is made of the kinds of forestry measures that could increase or extend timber supplies, and thus modify economic and environmental impacts of inadequate supplies and rising prices of timber products.

Projections of demand and supplies developed in preceding chapters are summarized in tables 155 and 156 and in figures 81, 82, 83, and 84.

SOFTWOOD DEMAND-SUPPLY BALANCES WITH 1970 LEVELS OF FOREST MANAGEMENT

Demands on U.S. forests for softwood timber products—after allowances for imports and exports—have been projected to increase from 8.8 billion cubic feet in 1970 to a range of 11.1 to 15.1 billion cubic feet by the year 2000 with the specified price assumptions used in this study and the medium level of population and economic growth (table 155 and fig. 81).

The base projection of softwood timber supplies from U.S. forests rises from an estimated 8.8 billion cubic feet in 1970 to 11.5 billion cubic feet by 2000, that is, to the lower part of the projected range in demand.

Comparisons of these supply and demand projections indicate that under the economic and other conditions assumed in this analysis fairly substantial increases in prices of timber products relative to the general price level will be necessary to balance demands and available supplies of timber. This is illustrated below for the softwood sawtimber component of the timber resource.

SOFTWOOD SAWTIMBER SUPPLY-DEMAND BALANCES WITH 1970 LEVELS OF MANAGEMENT

Projected demands on U.S. forests for softwood sawtimber products—after allowances for imports and exports—rise from actual consumption of 46.2 billion board feet in 1970 to a range of 49.1 to 71.8 billion board feet by 2000 under the specified price assumptions used in this analysis (table 155 and fig. 82).

The base projection of available supplies of softwood sawtimber from U.S. forests, assuming 1970 management levels and other conditions such as harvesting schedules specified in Chapter II, show moderate increases to 54.2 billion board feet by 2000. Economic projections of supply related to alternative price levels for the most part are below these base projections.

These projections of economically available supplies of softwood sawtimber by 1980 range from 47 billion board feet annually at 1970 prices to about 53 billion board feet with prices of softwood lumber and plywood 50 percent above 1970 levels. In 2000 these economic projections of supply converge to nearly the same level. Differences in the time paths of timber supplies with alternative prices illustrate in part consequences of a faster increase in harvesting in the 1970's than assumed in the base projections.

Possible future price paths.—It is evident from these comparisons of demands and supplies that a significant rise in prices of softwood lumber and plywood over 1970 levels will be necessary to balance supply and demand in future decades under the economic and management conditions assumed in this analysis.

Softwood roundwood - demand on U.S. forests and domestic supply

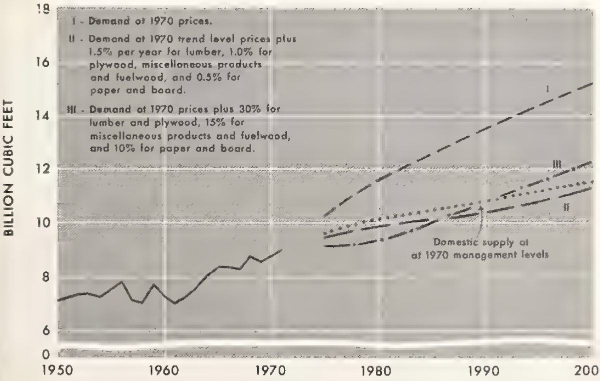


Figure 81

Softwood sawtimber - demand on U.S. forests and domestic supply

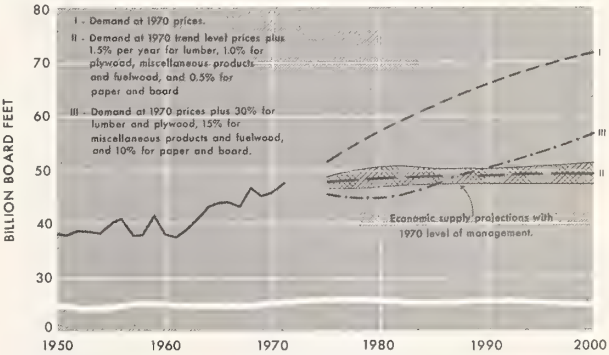


Figure 82

TABLE 155.—*Summary of softwood timber demand, exports, imports and demand on and supply from U.S. forests, 1952, 1962, and 1970, with projections to 2000 (medium level) under alternative price and management assumptions*

BILLION CUBIC FEET

Item	1952[1]	1962[1]	1970[1]	Projections								
				1970 relative prices			Rising relative prices[2]			Relative prices above 1970 averages[3]		
				1980	1990	2000	1980	1990	2000	1980	1990	2000
Total U.S. demand	8.4	8.5	9.7	12.1	14.1	15.8	11.2	12.4	13.5	10.7	12.7	14.3
Exports	.2	.4	1.2	1.7	1.6	1.6	1.7	1.6	1.6	1.7	1.6	1.6
Imports	1.3	1.7	2.1	2.3	2.3	2.3	3.1	3.7	4.0	3.2	3.6	3.7
Demand on U.S. forests	7.3	7.2	8.8	11.5	13.4	15.1	9.8	10.3	11.1	9.2	10.7	12.2
Supply from U.S. forests—base projections[4]	7.3	7.2	8.8	10.1	10.7	11.5	10.1	10.7	11.5	10.1	10.7	11.5
Supply-demand balance	------	------	------	−1.4	−2.7	−3.6	+0.3	+0.4	+0.4	+0.9	------	−.7
BILLION BOARD FEET, INTERNATIONAL ¼-INCH LOG RULE												
Total U.S. demand	39.9	41.7	47.6	58.9	66.5	72.6	51.5	54.1	55.0	48.7	55.8	61.9
Exports	.6	1.1	4.6	5.6	5.6	5.6	5.6	5.6	5.5	5.6	5.6	5.6
Imports	2.4	4.6	5.9	6.6	6.5	6.4	8.9	10.8	11.4	9.6	10.8	10.8
Demand on U.S. forests	38.1	38.2	46.2	57.9	65.6	71.8	48.2	48.9	49.1	44.7	50.6	56.7
Supply from U.S. forests—base projections[4]	38.1	38.2	46.2	48.8	50.9	54.2	48.8	50.9	54.2	48.8	50.9	54.2
Supply-demand balance	------	------	------	−9.1	−14.7	−17.6	+0.6	+1.0	+5.1	+4.1	+0.3	−2.5
Supply from U.S. forests—economic projections[5]	------	------	------	46.8	47.4	47.0	48.0	49.6	51.0	50.8	50.0	48.6
Supply-demand balance	------	------	------	−11.1	−18.2	−24.8	−0.2	−0.7	+1.9	+6.1	−0.6	−8.1
Increased supply from U.S. forests with intensified management[6]	------	------	------	------	------	------	------	------	------	+1.6	+2.7	+4.7
Supply-demand balance	------	------	------	------	------	------	------	------	------	+7.7	+2.1	−3.4

[1] Data for 1952, 1962, and 1970 are estimates of actual consumption of harvests and differ somewhat from the "trend" estimates shown in Chapter II.

[2] Relative prices rising from their 1970 trend levels as follows: lumber—1.5 percent per year; plywood, miscellaneous products and fuelwood—1.0 percent per year; paper and board—0.5 percent per year. This would mean a cumulative increase of 62 percent for lumber by the year 2000, and 17 percent for paper and board.

[3] Relative prices of lumber and plywood 30 percent, miscellaneous products and fuelwood 15 percent, and paper and board 10 percent above their 1970 averages.

[4] Base projections of supply are defined in Chapter II as the amounts of timber that would be available for harvesting if: (1) forestry programs continued at 1970 levels, (2) timber removals in the East changed on a straight line basis from actual removals in 1970 to a balance with growth in the year 2000 and thereafter, (3) removals on private lands in the West followed trends suggested by recent management and operating practices, and allowable cuts on public lands remained at the 1970 level.

[5] Projections of supply related to alternative price levels, and 1970 level of management, with some adjustments for recent environmental constraints on National Forests harvests.

[6] Increases on supply from a program of $69 million annually for commercial thinnings, planting, and timber stand improvement on areas of nonindustrial private and National Forest lands that will yield more than 5 percent return on investments. Supplies could be further increased with other investment criteria, investments in other management or utilization opportunities, or investments on other ownerships.

Note: Data may not add to totals because of rounding.

Sources: Data for 1952, 1962, and 1970 based on information published by the U.S. Departments of Commerce and Agriculture.

Projections: U.S. Department of Agriculture, Forest Service.

An equilibrium price path cannot be determined with any exactness, but under the specific conditions assumed in Chapters II and V, trend level prices of softwood lumber and plywood (relative to the general price level) by 1980 might average roughly 20–25 percent above 1970, with an increase of roughly 50–60 percent by the year 2000.

The indicated price path for softwood lumber that appears likely under these specific conditions would be generally consistent with price trends of prior decades when supplies and demands for

TABLE 156.—*Summary of hardwood timber demand, exports, imports and demand on and supply from U.S. forests, 1952, 1962, and 1970, with projections to 2000 (medium level) under alternative price assumptions and 1970 level of management*

BILLION CUBIC FEET

Item	1952[1]	1962[1]	1970[1]	Projections								
				1970 relative prices			Rising relative prices[2]			Relative prices above 1970 averages[3]		
				1980	1990	2000	1980	1990	2000	1980	1990	2000
Total U.S. demand	3.5	3.1	3.0	4.3	5.5	7.0	4.0	4.7	5.7	3.9	4.9	6.4
Exports	(4)	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
Imports	.1	.2	.3	.4	.4	.4	.5	.5	.6	.6	.6	.6
Demand on U.S. forests	3.5	3.0	2.9	4.1	5.3	6.8	3.7	4.4	5.3	3.5	4.5	6.0
Supply from U.S. forests—base projections[5]	3.5	3.0	2.9	5.2	6.3	7.4	5.2	6.3	7.4	5.2	6.3	7.4
Supply-demand balance	------	------	------	+1.1	+1.0	+0.6	+1.5	+1.9	+2.1	+1.7	+1.8	+1.4
BILLION BOARD FEET, INTERNATIONAL ¼-INCH LOG RULE												
Total U.S. demand	11.6	11.7	12.3	16.3	20.3	24.3	14.5	16.7	19.1	14.0	17.4	21.1
Exports	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
Imports	.3	1.0	1.3	2.0	2.0	2.0	2.0	2.3	2.7	2.4	2.4	2.4
Demand on U.S. forests	11.5	10.9	11.2	14.5	18.5	22.5	12.7	14.6	16.6	11.8	15.2	18.9
Supply from U.S. forests—base projections[5]	11.5	10 9	11.2	15.5	18.2	20.6	15.5	18.2	20.6	15.5	18.2	20.6
Supply-demand balance	------	------	------	+1.0	−0.3	−1.9	+2.8	+3.6	+4.0	+3.7	+3.0	+1.7

[1] Data for 1952, 1962, and 1970 are estimates of actual consumption and harvests and differ somewhat from the "trend" estimates shown in Chapter II.

[2] Relative prices rising from their 1970 trend levels as follows: lumber—1.5 percent per year; plywood, miscellaneous products and fuelwood—1.0 percent per year; paper and board—0.5 percent per year.

[3] Relative prices of lumber and plywood 30 percent, miscellaneous products and fuelwood 15 percent, and paper and board 10 percent above their 1970 averages.

[4] Less than 50 million cubic feet.

[5] Base projections of supply are defined in Chapter II as the amount of timber that would be available for harvesting if: (1) forestry programs continued at 1970 levels, (2) timber removals in the East changed on a straight-line basis from actual removals in 1970 to a balance with growth in the year 2000 and thereafter, (3) removals on private lands in the West followed trends suggested by recent management and operating practices, and allowable cuts on public lands remained at the 1970 level.

Note: Data may not add to totals because of rounding.

Sources: Data for 1952, 1962, and 1970 based on information published by the U.S. Departments of Commerce and Agriculture.

Projections: U.S. Department of Agriculture, Forest Service.

softwood lumber were balanced at successively higher relative prices that increased an average of 1.7 percent annually.

Projected trends in such equilibrium prices for different timber products also differ as in the past. Thus, in contrast to a possible increase of 50–60 percent in prices of softwood lumber and plywood by 2000, under the conditions specified in this analysis relative prices of paper and board might be no more than 15–20 percent above 1970 prices. Greater increases in prices may be necessary in the pulp and paper industry, however, to attract the capital required to meet projected demands.

Stumpage price increases also could be expected to be considerably greater on a percentage basis than increases in equilibrium prices of processed products such as lumber. According to past relationships such as described in Chapter V, an increase of 50–60 percent in softwood lumber and plywood prices, for example, would result in an average increase of over 100 percent in relative average prices of softwood sawtimber stumpage.

Projection alternatives.—In view of the many uncertainties involved in both demand and supply projections, estimates of prices at which supply and demand might be balanced must be regarded as very general approximations that would only be realized under the assumed conditions underlying these specific projections.

Many factors could, of course, lead to different price paths than indicated by this analysis. These include different rates of economic growth, different trends in technology, or different demand elasticities than specified in Chapter V, with consequent changes in demand projections.

Supplies could be lower than projected as a result of various factors such as more diversion of forest lands to other uses than assumed, more constraints on timber management because of environmental factors, nontimber objectives of forest owners, or extraordinary mortality losses. Different supply responses to price changes than assumed in the economic supply projections also could result in higher or lower supply trends than shown by these projections. Intensification of forest management, or faster improvement in utilization in woods and mills than assumed, could add to these projections of supply.

SOFTWOOD SAWTIMBER SUPPLIES WITH INTENSIFIED MANAGEMENT AND UTILIZATION

An analysis of investment opportunities in reforestation, stand improvement, thinning, and other timber management practices, presented in Chapter III, illustrates numerous opportunities for increasing domestic timber supplies.

An example of investment opportunities on National Forests and farm and miscellaneous private ownerships judged to be capable of returning at least 5 percent on additional investments indicated that intensification of management could provide increases in supplies of softwood sawtimber of 1.6 billion board feet in 1980, 4.7 billion board feet in 2000, and 13 billion board feet in 2020 (table 155). Such a program of intensification assumed softwood lumber and plywood prices averaging 30 percent above 1970 and an estimated cost of $69 million annually (at 1971 prices).

Some increases in timber supply from closer utilization, thinnings, and salvage could be achieved promptly. The allowable cut effect also would permit other early increases in harvesting following intensification of management on many public lands. Much of the increase in supply from intensified management, however, would become available only after 2000.

Biological limits of timber growth and potential harvests are estimated to be much in excess of these initial projections of intensification opportunities. More of the growth potential of the Nation's forests could be captured with similar intensification of forestry practices on industrial and other public lands, and with measures such as fertilization that were not included in the analysis in Chapter III. Use of investment criteria other than a minimum rate of return of 5 percent as used in this study could also permit intensification on more of the Nation's timberlands.

Timber supplies could be extended by improved technology, including adoption of processing equipment and methods that would increase recovery of usable products from available supplies of roundwood beyond amounts projected in this analysis.

If timber supplies were increased by such added investments in timber management and utilization, prospective rises in equilibrium prices of timber products could be significantly moderated, particularly after the turn of the century.

HARDWOOD DEMAND-SUPPLY BALANCES WITH 1970 LEVELS OF FOREST MANAGEMENT

Demands on U.S. forests for hardwood timber products—after allowances for imports and exports—have been estimated to rise from about 2.9 billion cubic feet in 1970 to a range of 5.3 to 6.8 billion cubic feet by 2000 under the alternative price assumptions and the medium level of population and economic growth used in this analysis (table 156 and fig. 83).

Potentially available supplies of hardwood timber from U.S. forests, as indicated by the base projections developed in Chapter II, increase from 2.9 billion cubic feet in 1970 to about 7.4 billion cubic feet by 2000. Thus, total supplies of hardwood potentially available in terms of cubic feet exceed projected demands throughout the 1970-2000 period. While this implies that increases in relative prices are not likely, wide differences in timber quality and availability indicate a variable outlook for supply-price relationships.

HARDWOOD SAWTIMBER SUPPLY-DEMAND BALANCES WITH 1970 LEVELS OF FOREST MANAGEMENT

In the case of hardwood sawtimber, projected demands on U.S. forests—after allowances for imports and exports—rise from 11.2 billion board feet in 1970 to a range of 16.6 to 22.5 billion board

Hardwood roundwood - demand on U.S. forests and domestic supply

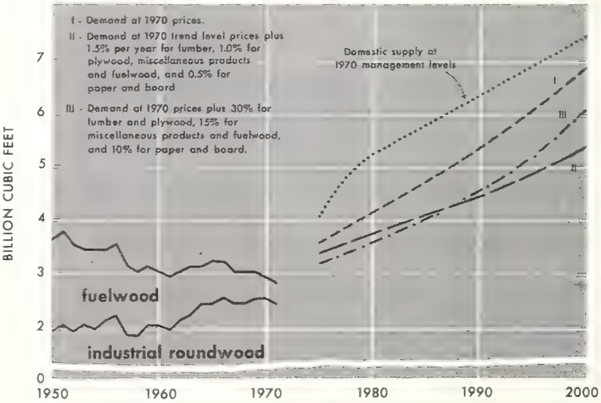
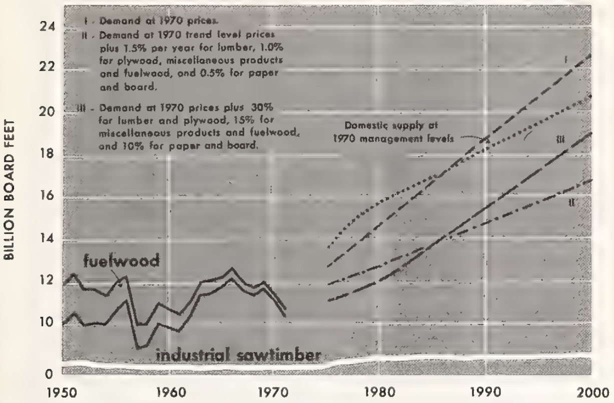


Figure 83



Hardwood sawtimber - demand on U.S. forests and domestic supply

Figure 84

feet in 2000, depending on the price assumption specified (table 156 and fig. 84).

Potentially available supplies of hardwood sawtimber products, as indicated by the base projection, rise from 11.2 billion board feet in 1970 to 20.6 billion board feet by 2000. These projections of supply also exceed projected demands, except in the case of the 1970 price assumption after 1980.

In general these projections for hardwood sawtimber show a more favorable supply and price outlook than for softwoods. However, it is quite possible as in the case of softwoods that not all of the potentially available supplies indicated by the base projection will in fact be actually available, particularly at 1970 price levels. Recent increases in relative prices of hardwood lumber, and sharp increases in prices for certain preferred species and higher grades of hardwood timber, indicate that statistics on total inventories, net growth, and available removals overstate volumes economically accessible and available for sale by the large numbers of private owners who own most hardwood timber resources.

Hardwood timber inventories and growth are far from homogeneous and statistics on supply and consumption do not include the same mix of species and sizes of timber. Much of the growth and available supply of hardwoods is in small trees and in large numbers of species for which markets are limited. A major part of the harvest, on the other hand, is concentrated on larger sizes of preferred species such as white oak, sweetgum, yellow birch, hard maple, walnut, and black cherry. Removals of such higher grade material and species have been close to or above annual growth.

It seems likely therefore, that relative prices of hardwood timber products may also continue to rise, particularly for the preferred species and larger sizes. For some time to come, however, hardwood price increases could be restrained by increased imports of tropical hardwood products, as indicated in Chapter IV.

HARDWOOD SUPPLY-DEMAND VOLUMES WITH INTENSIFIED MANAGEMENT

Supplies of hardwoods from domestic forests could be augmented in time by intensified forest management. As indicated by the case studies cited in Chapter III, hardwood supplies could be significantly increased in terms of value, and to lesser extent in terms of volume, by such practices as cleaning and precommercial thinning of young stands to improve species composition and spacing. Commercial thinning of older stands would concentrate growth on the more desirable trees. In many cases protection against animals such as deer also is necessary to assure desirable stand composition. Because of the large variety of species present in many hardwood stands, such measures are essential to capture value potentials.

IMPLICATIONS FOR TIMBER INDUSTRIES

The increases in timber prices and the supply problems that appear to be in prospect can be expected to have significant impacts on softwood lumber and plywood industries. Prospective limitations on timber supplies and increases in prices will limit expansion potentials for these products in housing and other markets, and necessitate greater dependence on competitive materials for many uses.

Producers of high-quality hardwood lumber and hardwood plywood face a similar situation of limited and higher cost wood supplies. The outlook is better, however, for producers of hardwood construction timber, pallet lumber, railroad ties, and other products that can be manufactured from the lower quality hardwoods that are in relatively abundant supply.

The outlook for the pulp and paper industry is relatively favorable to the extent that this industry can use small and low-quality material, hardwoods, plant and logging residues, and recycled fibers as well as round softwood pulpwood. Nevertheless, price increases for timber used by the lumber and plywood industries can be expected to have direct impacts on pulpwood prices. All the forest industries compete to some extent for the same sizes and species of timber, and price rises for larger and higher quality trees can be expected to extend to some extent to the entire timber resource. The pulp and paper industry as well as other timber users thus has a major interest in intensifying forest management and improving utilization to meet potential timber demands.

Higher prices for timber and timber products will of course improve the profitability of forest managment and thus should encourage more investments in timber growing and expansion of public forestry programs. This would help increase timber supplies although, as pointed out in Chapter III, these are largely long-range solutions to problems of timber supply.

Prospective trends in timber availability also point to changes in the geographic location of timber industries. A continuing drop in softwood timber supplies in the West can be expected, as shown in Chapter II, while a substantial expansion of timber supplies and wood-based industries is anticipated in the South.

DEPENDENCE ON NET IMPORTS OF TIMBER

The estimates of timber demands and supplies summarized in tables 155 and 156 include significant volumes of both imports and exports of timber products, both in 1970 and in the projection period. Net imports are assumed to increase from 8 percent of U.S. consumption in 1970 to about 15 percent of projected demands in 2000 under the assumption of "rising" timber prices.

Potentials for increases in net imports of timber products beyond amounts assumed in this analysis appear to be limited, both by physical availability of timber supplies from other countries and by economic and political factors. Not the least of the potential problems involved in greater dependence on net imports would be the increased need for foreign exchange and resulting adverse impacts on the U.S. balance of payments position.

ECONOMIC AND ENVIRONMENTAL EFFECTS OF RISING TIMBER PRICES

If timber supplies are insufficient to meet growing demands for lumber, plywood, and other wood products, builders and other users of these materials can shift many demands to competing materials such as metals, plastics, and concrete. Considerable substitution of this nature has, of course, occurred in the past with increasing relative prices of lumber. Mineral-based products and steel have made heavy inroads in many traditional wood uses in construction, for example, while plastics have been increasingly used for such items as boats, furniture, and packaging.

Higher prices of timber products and a shift to greater use of competitive materials will lead, however, to increased costs of houses, furniture, and many other goods. Although total and per capita incomes are assumed to increase substantially, higher materials costs would necessarily have some adverse impacts on volumes and quality of housing production, for example, and thus on consumer welfare.

Continuing shifts to other raw materials necessitated by limited timber supplies could also increase adverse industrial impacts on the environment. The air, water, and land pollution resulting from production of substitute materials such as steel, concrete products, and aluminum is of greater magnitude than in the case of timber products such as lumber and plywood. In many cases such impacts apparently can be reduced to acceptable levels but the expenditures necessary to control pollution will tend to increase costs of these materials.

Energy requirements and costs of processing competing materials also are much higher than for timber products. It is estimated that use of steel framing for exterior walls in residential construction, for example, requires over three times the amount of processing energy needed to produce lumber for comparable installations.[1] For aluminum and concrete blocks, energy requirements are estimated to average more than eight times the requirements for lumber. There are likewise substantial differences in typical heating and cooling costs with alternative materials that favor use of wood products in housing construction.[2]

While such estimates cannot be viewed as exact measures of energy requirements because of variations in structures, building practices, and other factors, differences in use of energy as well as relative pollution impacts are believed to be of considerable significance in evaluating the future situation and in developing programs to assure future raw material supplies.[3]

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[1] Dane, C. W. Energy requirements for wood and wood substitutes and the "energy crises." USDA Forest Serv., Forest Econ. and Market. Res., 17 p. Processed. 1972.

[2] National Forest Products Association. The energy conservation issue—how wood helps reduce power consumption and home operating costs. Washington, D.C. 1972.

[3] For further discussion of these points, see:

Dane, C. W. The price outlook of steel products substitutable for wood. USDA Forest Serv., Forest Econ. and Market. Res., 38 p. Processed. 1972.

——— The long-term price outlook for concrete products that are substitutable for wood. USDA Forest Serv., Forest Econ. and Market. Res., 39 p. Processed. 1972.

——— The long-term price outlook for aluminum products substitutable for wood. USDA Forest Serv., Forest Econ. and Market. Res., 43 p. Processed. 1972.

——— Energy requirements for wood and wood substitutes and the "energy crises." USDA Forest Serv., Forest Econ. and Market. Res., 17 p. Processed. 1972.

——— The hidden environmental costs of alternative materials available for residential construction. USDA Forest Serv., Forest Econ. and Market. Res., 14 p. Processed. 1972.

Haygreen, John G. Wood products an uncertain future. Minnesota Forest Products Marketing Bul. 15(2):1–3. June 1972.

Saeman, Jerome F. The wood resource and the environment—some national options and alternatives. USDA Forest Serv., Forest Prod. Lab. 1970.

Vaux, Henry J. Continuing education for a changing environment. Univ. of California, School of Forestry and Conservation. Berkeley. June 1972.

Zivnuska, John A. Will wood products be cheap or expensive? Seventh World Forestry Congress, Argentina. Oct. 1972.

Among other aspects of the question of substitution is the increasingly serious problem of waste disposal. Wood products that are not recycled for paper and board, for example, are highly biodegradable in contrast to most competitive materials.

Another important consideration in a shift to greater use of nontimber materials is the long-run effect of accelerated use of nonrenewable stocks of ores and energy materials. Coal, petroleum, and natural gas once used are gone forever, and minerals can be extracted only at rising real costs. Forests, on the other hand, constitute a renewable resource that can continue to produce timber indefinitely.

Substantial portions of the aluminum and steel consumed in the United States, moreover, are derived from foreign sources, and projections indicate the necessity of more and more U.S. dependence on foreign supplies of metals, petroleum, and other materials. Increased use of wood substitutes consequently could have adverse impacts on the U.S. balance of payments.

For these various reasons, efforts to produce increased crops of timber, in lieu of increasing dependence on substitute materials, may have much more justification than indicated by conventional cost-benefit analyses.

OPPORTUNITIES FOR INTENSIFIED TIMBER MANAGEMENT AND UTILIZATION

Additional supplies of timber beyond amounts available with 1970 levels of management and utilization could be obtained from domestic forests, particularly under the stimulus of higher prices and adoption of improved technology. As indicated in Chapter III, many opportunities for increasing supplies exist on both public and private lands, including measures such as the following:

- *Commercial thinning and salvage.*—Intermediate harvesting of timber stands could increase log supplies, especially on the Pacific Coast, and particularly with increased price levels and advance road construction to improve forest access. More salvage of the 11 billion board feet of annual mortality of softwood sawtimber scattered throughout the various regions also could help stretch available log supplies.
- *Closer utilization of logging and plant residues.*—About 3 billion cubic feet of sound wood was left unused on logging operations and in primary processing plants in 1970. Much more progress in utilizing such material is possible, especially with rising prices and continued expansion of the pulp and paper industry.
- *Improved technology in wood processing and construction.*—Many improvements in equipment and processing methods have been adopted by the forest industries in recent decades, and it has been assumed in this analysis that recovery of products from available log supplies will continue to increase. There are additional opportunities to further extend available log supplies, however, by use of new equipment such as high strain thin saws, for example, and modified pulping methods to produce higher pulp yields. Better design in construction of housing and other structures, including stress grading in some applications, also could save significant amounts of lumber and plywood.
- *Increased recycling of wood fiber.*—About 19 percent of the fibrous materials used for paper and board in the United States in 1970, or 10.5 million tons, was recycled wastepaper and board. Such use of recycled fiber has been assumed to rise to 34 percent of the total mix of fibers used in pulping by 2000, or somewhat below experience in some other countries. Increases in recycling of paper and board of at least the magnitude assumed in this study appears likely to be both environmentally essential and economically desirable in meeting potential demands for fiber products.
- *Tree planting.*—On many areas conversion of the existing cover to plantations will be necessary to capture the timber growth potential. Use of genetically improved trees also will require planting rather than natural regenerating. Tree planting, together with other measures such as site preparation and prescribed burning where necessary, could increase timber yields on many millions of acres in the South and in other regions. Prompt restocking to shorten regeneration periods after harvesting also could permit an almost immediate increase in allowable cuts on National Forests and certain other lands.
- *Timber stand improvement.*—Precommercial thinning and removal of cull trees offer many practical opportunities for enhancing future yields, especially with rising timber prices and particularly in hardwood stands and Rocky Mountain forests.
- *Improved forest protection.*—Better control of destructive insects and diseases such as bark beetles, dwarf mistletoe, and major defoliators, improved forest fire control, and prevention of animal damage could add to available timber supples by reducing the substantial continuing mortality and growth losses to those destructive agents.

- *Forest fertilization.*—Experience to date also indicates that forest fertilization will be a practical way to increase timber growth and yields in many situations.

- *Improvements in technology.*—Continuing research to provide new knowledge is of large importance in improving management of forest lands for timber production while assuring balanced output of both timber and other forest goods and services such as recreation, water, and wildlife.

Such measures to increase timber growth and harvests will require substantial public and private investments. Large expenditures also will be needed to provide the plant and equipment necessary to extend timber supplies by improved utilization in the harvesting, processing, and use of timber products.

Potential imbalances between rising demands for timber and available supplies are part of a worldwide problem of assuring adequate raw materials for housing and a multitude of other uses and products. A shift from timber to greater dependence on substitute materials is possible, but entails problems of cost, pollution impacts, dependence on foreign suppliers, and additional balance of payments problems. Increasing timber supplies from domestic forests, while assuring a balance with other uses and environmental protection, is an alternative that is technically and economically feasible even though time and substantial expenditures will be necessary. The outlook for timber is thus a matter of far-reaching public and private concern.

APPENDIX I

Forest Statistics, 1970

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TABLE 1.—*Land areas in the United States, by major class of land, section, region, and State, January 1, 1970* [1]

[Thousand acres]

Section, region, and State	Total land area [2]	Forest land					Crop land [3]	Other land [4]
		Total	Commercial	Productive reserved	Deferred	Unproductive		
New England:								
Connecticut	3,116	2,186	2,169	11	0	6	225	705
Maine	19,797	17,748	16,894	220	0	633	894	1,154
Massachusetts	5,013	3,520	3,491	18	0	11	250	1,243
New Hampshire	5,781	5,131	5,020	23	0	88	210	439
Rhode Island	671	433	429	4	0	0	35	203
Vermont	5,935	4,391	4,364	7	0	20	760	784
Total	40,314	33,410	32,367	284	0	759	2,374	4,530
Middle Atlantic:								
Delaware	1,268	391	390	1	0	0	495	382
Maryland	6,369	2,960	2,882	35	0	43	1,780	1,629
New Jersey	4,820	2,463	2,354	67	0	42	660	1,697
New York	30,636	17,377	14,489	2,480	0	407	5,825	7,433
Pennsylvania	28,816	17,832	17,478	194	0	160	5,575	5,409
West Virginia	15,413	12,172	12,092	46	0	34	880	2,361
Total	87,324	53,196	49,685	2,824	0	687	15,215	18,913
Lake States:								
Michigan	36,492	19,273	18,800	268	0	205	9,454	7,764
Minnesota	50,745	18,984	16,875	562	0	1,547	22,243	9,517
North Dakota	44,339	421	406	3	0	12	27,445	16,471
South Dakota (East)	41,727	334	223	0	0	111	18,129	23,262
Wisconsin	34,858	14,945	14,536	34	0	374	12,043	7,869
Total	208,162	53,959	50,840	867	0	2,251	89,316	64,885
Central:								
Illinois	35,761	3,789	3,680	44	0	65	23,867	8,103
Indiana	23,161	3,908	3,840	38	0	30	13,317	5,935
Iowa	35,867	2,455	2,430	25	0	0	26,356	7,056
Kansas	52,515	1,344	1,187	0	0	157	29,421	21,750
Kentucky	25,504	11,968	11,826	80	0	61	8,725	4,811
Missouri	44,189	14,919	14,600	91	0	228	17,960	11,310
Nebraska	48,974	1,045	1,023	13	0	8	22,099	25,829
Ohio	26,251	6,498	6,422	76	0	0	11,525	8,228
Total	292,225	45,928	45,008	370	0	550	153,272	93,024
Total, North	628,026	186,494	177,901	4,345	0	4,247	260,178	181,353
South Atlantic:								
North Carolina	31,367	20,613	20,192	372	0	48	5,274	5,478
South Carolina	19,366	12,493	12,410	70	0	12	4,033	2,838
Virginia	25,496	16,389	15,859	313	0	216	3,438	5,669
Total	76,229	49,496	48,463	755	0	277	12,746	13,986
East Gulf:								
Florida	35,179	17,932	16,231	94	0	1,606	3,692	13,554
Georgia	37,295	25,545	25,102	389	0	54	6,367	5,382
Total	72,474	43,478	41,334	483	0	1,661	10,059	18,936
Central Gulf:								
Alabama	32,678	21,770	21,742	21	0	6	5,118	5,789
Mississippi	30,290	16,913	16,891	21	0	0	6,565	6,812
Tennessee	26,474	13,136	12,819	316	0	0	7,855	5,483
Total	89,444	51,819	51,453	359	0	6	19,539	18,085
West Gulf:								
Arkansas	33,324	18,277	18,206	41	0	29	8,525	6,521
Louisiana	28,867	15,380	15,342	38	0	0	5,558	7,928
Oklahoma	44,149	9,340	4,817	34	0	4,488	13,010	21,799
Texas	168,300	24,091	12,924	7	0	11,160	34,268	109,940
Total	274,642	67,090	51,290	120	0	15,678	61,362	146,189
Total, South	512,791	211,884	192,542	1,719	0	17,623	103,707	197,198

See footnotes at end of table.

TABLE 1.—*Land areas in the United States, by major class of land, section, region, and State, January 1, 1970* [1]—Continued

[Thousand acres]

Section, region, and State	Total land area [2]	Forest land					Crop land [3]	Other land [4]
		Total	Commercial	Productive reserved	Deferred	Unproductive		
Pacific Northwest:								
Alaska:								
Coastal	32,926	13,247	5,639	194	74	7,340	1	19,678
Interior	332,555	105,804	0	6	0	[5] 105,798	22	226,729
Summary	365,481	119,051	5,639	200	74	113,138	23	246,407
Oregon:								
Western	19,171	15,791	14,635	271	3	882	1,690	1,690
Eastern	42,403	14,613	11,038	376	55	3,144	3,592	24,198
Summary	61,574	30,404	25,673	647	58	4,026	5,282	25,888
Washington:								
Western	15,843	12,743	9,991	1,073	55	1,624	769	2,331
Eastern	26,822	10,355	8,410	373	88	1,484	7,296	9,171
Summary	42,665	23,098	18,401	1,446	143	3,108	8,065	11,502
Total	469,720	172,553	49,713	2,293	275	120,272	13,370	283,797
Pacific Southwest:								
California	100,091	42,408	16,828	941	157	24,482	11,815	45,868
Hawaii	4,106	1,974	1,081	86	0	807	490	1,641
Total	104,197	44,382	17,909	1,027	157	25,289	12,305	47,509
Total, Pacific Coast	573,917	216,935	67,622	3,320	432	145,561	25,675	331,306
Northern Rocky Mountain:								
Idaho	52,933	21,591	15,192	1,837	735	3,826	5,181	26,159
Montana	93,258	22,777	15,983	1,390	641	4,763	14,357	56,123
South Dakota (West)	6,878	1,399	1,310	15	0	73	535	4,943
Wyoming	62,342	10,085	4,182	2,711	121	3,069	2,199	50,058
Total	215,413	55,853	36,668	5,954	1,498	11,731	22,274	137,285
Southern Rocky Mountain:								
Arizona	72,688	18,583	3,689	546	10	14,336	1,447	52,656
Colorado	66,485	22,534	11,583	537	702	9,711	9,620	34,330
Nevada	70,264	7,660	128	5	0	7,526	568	62,035
New Mexico	77,766	18,313	5,736	584	48	11,944	1,886	57,566
Utah	52,697	15,288	3,824	232	22	11,209	1,627	35,781
Total	339,901	82,380	24,963	1,906	783	54,727	15,151	242,369
Total, Rocky Mountain	555,315	138,234	61,631	7,861	2,281	66,459	37,425	379,655
Total, all regions	2,270,050	753,549	499,697	17,246	2,713	233,891	426,986	1,089,513

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[1] Data may not add to totals because of truncating. Zeros indicate no data or negligible amounts.

[2] U.S. Bureau of Census, Land and Water Area of the United States, 1960.

[3] Source: 1964 Census of Agriculture.

[4] Includes pasture and range, swampland, industrial and urban areas, other nonforest land.

[5] Some parts of this area in Interior Alaska meet standards for commercial forest land, but the detailed survey of the Interior is not complete.

TABLE 2.—*Area of commercial timberland in the United States, by ownership, and section, region, and State, as of December 31, 1952 and 1962, and January 1, 1970* [1]

[Thousand acres]

Section, region, and State	Year	All ownerships	Public								Private			
			Total public	Federal					State	County and municipal	Total private	Forest industry	Farmer	Misc laneous private
				Total Federal	National Forest	Bureau of Land Management	Indian	Miscellaneous Federal						
New England:														
Connecticut	1970	2,169	155	1	0	0	0	1	122	32	2,014	3	304	1,707
	1962	2,105	155	1	0	0	0	1	122	32	1,950	3	414	1,533
	1952	1,973	155	1	0	0	0	1	122	32	1,818	3	670	1,145
Maine	1970	16,894	311	73	37	0	0	35	163	75	16,582	8,255	1,122	7,205
	1962	16,779	205	66	39	0	0	27	64	75	16,574	6,521	2,146	7,907
	1952	16,609	182	90	39	0	0	51	41	51	16,427	6,617	2,923	6,887
Massachusetts	1970	3,491	399	29	0	0	0	29	280	90	3,092	259	442	2,391
	1962	3,417	399	29	0	0	0	29	280	90	3,018	259	602	2,157
	1952	3,259	399	29	0	0	0	29	280	90	2,860	259	887	1,714
New Hampshire	1970	5,020	696	578	568	0	0	9	65	52	4,324	793	642	2,889
	1962	4,937	697	579	569	0	0	10	66	52	4,240	793	863	2,584
	1952	4,818	682	585	580	0	0	5	45	52	4,136	771	1,333	2,032
Rhode Island	1970	429	26	0	0	0	0	0	13	13	403	0	43	360
	1962	429	26	0	0	0	0	0	13	13	403	0	67	336
	1952	430	26	0	0	0	0	0	13	13	404	0	104	300
Vermont	1970	4,364	405	230	226	0	0	3	131	43	3,958	678	1,084	2,196
	1962	4,210	329	231	223	0	0	8	79	19	3,881	528	1,543	1,810
	1952	3,845	297	199	191	0	0	8	79	19	3,548	528	1,925	1,095
Total	1970	32,367	1,993	911	832	0	0	79	775	306	30,374	9,988	3,637	16,748
	1962	31,878	1,811	906	831	0	0	75	624	281	30,067	8,104	5,635	16,328
	1952	30,935	1,741	904	810	0	0	94	580	257	29,194	8,178	7,842	13,174
Middle Atlantic:														
Delaware	1970	390	9	1	0	0	0	1	8	0	381	29	142	209
	1962	391	9	1	0	0	0	1	8	0	382	24	172	185
	1952	392	13	1	0	0	0	1	10	2	379	20	213	145
Maryland	1970	2,882	189	13	0	0	0	13	144	31	2,692	100	728	1,863
	1962	2,845	214	54	0	0	0	54	128	32	2,631	57	956	1,618
	1952	2,854	214	54	0	0	0	54	128	32	2,640	57	1,278	1,305
New Jersey	1970	2,354	254	17	0	0	0	17	237	0	2,100	4	195	1,901
	1962	2,262	254	17	0	0	0	17	237	0	2,008	4	298	1,706
	1952	2,050	181	1	0	0	0	1	130	50	1,869	4	443	1,422
New York	1970	14,489	892	57	0	0	0	57	711	123	13,597	1,180	3,583	8,833
	1962	13,417	895	98	0	0	0	98	714	83	12,522	1,172	4,158	7,192
	1952	11,952	895	98	0	0	0	98	714	83	11,057	1,172	4,987	4,898
Pennsylvania	1970	17,478	3,406	518	488	0	0	30	2,646	242	14,072	610	3,188	10,274
	1962	16,279	3,300	485	450	0	0	35	2,659	156	12,979	442	3,825	8,712
	1952	14,574	3,229	492	454	0	0	38	2,580	157	11,345	442	4,728	6,175
West Virginia	1970	12,092	1,046	893	879	0	0	14	144	9	11,045	530	2,071	8,444
	1962	11,543	1,036	883	869	0	0	14	144	9	10,507	530	2,663	7,314
	1952	10,276	982	895	881	0	0	14	83	4	9,294	270	3,465	5,559
Total	1970	49,685	5,796	1,500	1,367	0	0	133	3,890	405	43,888	2,454	9,907	31,526
	1962	46,737	5,708	1,538	1,319	0	0	219	3,890	280	41,029	2,229	12,072	26,728
	1952	42,098	5,514	1,541	1,335	0	0	206	3,645	328	36,584	1,965	15,114	19,505
Lake States:														
Michigan	1970	18,800	6,440	2,494	2,422	8	17	45	3,838	108	12,359	2,256	3,429	6,672
	1962	19,121	6,310	2,530	2,410	9	21	90	3,695	85	12,811	1,548	3,841	7,422
	1952	19,121	6,310	2,530	2,410	9	21	90	3,695	85	12,811	1,548	3,841	7,422
Minnesota	1970	16,875	9,388	2,784	2,127	64	500	92	3,304	3,300	7,486	814	3,236	3,436
	1962	17,062	9,539	2,819	2,141	64	521	92	3,303	3,416	7,522	714	3,344	3,463
	1952	17,368	10,158	3,055	2,195	49	717	94	3,484	3,619	7,210	578	4,151	2,481
North Dakota	1970	406	124	114	0	1	61	52	10	0	281	0	161	119
	1962	424	128	118	0	1	63	54	10	0	296	0	173	123
	1952	451	138	128	0	0	71	56	10	0	312	0	182	130
South Dakota (East)	1970	223	77	74	0	1	68	5	3	0	145	0	142	3
	1962	230	77	74	0	1	68	5	3	0	152	0	149	3
	1952	315	106	102	0	1	93	7	4	0	208	0	204	4
Wisconsin	1970	14,536	4,525	1,591	1,317	0	156	117	568	2,365	10,011	1,368	4,723	3,919
	1962	14,693	4,882	1,910	1,372	5	423	110	541	2,431	9,811	933	5,853	3,025
	1952	15,348	5,099	2,003	1,357	5	379	262	444	2,652	10,249	942	6,252	3,055
Total	1970	50,840	20,556	7,059	5,867	74	804	312	7,723	5,774	30,284	4,438	11,694	14,151
	1962	51,530	20,936	7,451	5,923	80	1,096	351	7,553	5,932	30,593	3,195	13,360	14,037
	1952	52,604	21,812	7,818	5,962	65	1,281	509	7,637	6,356	30,792	3,068	14,631	13,092

See footnote at end of table.

TABLE 2.—*Area of commercial timberland in the United States, by ownership, and section, region, and State, as of December 31, 1952 and 1962, and January 1, 1970* [1]—Continued

[Thousand acres]

Section, region, and State	Year	All ownerships	Public								Private			
			Total public	Federal					State	County and municipal	Total private	Forest industry	Farmer	Miscellaneous private
				Total Federal	National Forest	Bureau of Land Management	Indian	Miscellaneous Federal						
Central:														
Illinois	1970	3,680	267	256	214	0	0	41	11	0	3,412	16	2,107	1,288
	1962	3,761	240	229	187	0	0	41	11	0	3,521	16	2,216	1,288
	1952	3,830	226	216	184	0	0	32	10	0	3,604	10	2,961	633
Indiana	1970	3,840	360	213	136	0	0	77	146	1	3,479	21	2,605	851
	1962	3,930	294	177	112	0	0	65	115	2	3,636	9	2,853	774
	1952	4,015	283	172	112	0	0	60	109	2	3,732	9	2,848	875
Iowa	1970	2,430	34	10	0	0	1	9	22	1	2,395	9	2,129	257
	1962	2,480	36	12	2	0	1	9	22	1	2,443	4	2,175	263
	1952	2,595	36	12	2	0	1	9	22	1	2,558	0	2,282	276
Kansas	1970	1,187	36	26	0	0	0	26	8	1	1,150	0	798	352
	1962	1,194	36	26	0	0	0	26	8	1	1,157	0	805	352
	1952	1,208	26	26	0	0	0	26	0	0	1,181	0	821	359
Kentucky	1970	11,826	820	738	531	0	0	207	76	5	11,005	227	5,882	4,895
	1962	11,651	652	575	438	0	0	137	77	0	10,999	308	6,420	4,271
	1952	11,497	725	672	455	0	0	217	53	0	10,772	308	7,226	3,238
Missouri	1970	14,600	1,586	1,372	1,321	0	0	51	188	25	13,013	279	8,850	3,884
	1962	14,850	1,586	1,362	1,311	0	0	51	199	25	13,264	276	9,150	3,836
	1952	14,913	1,617	1,461	1,339	1	0	121	156	0	13,296	460	8,347	4,489
Nebraska	1970	1,023	94	83	57	0	9	17	11	0	928	0	789	138
	1962	1,034	93	81	57	0	7	17	11	0	940	0	802	138
	1952	1,050	62	50	28	0	5	17	11	0	988	0	849	138
Ohio	1970	6,422	365	138	129	0	0	8	222	4	6,056	126	2,616	3,314
	1962	6,041	360	88	88	0	0	0	231	41	5,681	74	2,882	2,725
	1952	5,450	297	88	88	0	0	0	168	41	5,153	30	3,512	1,611
Total	1970	45,008	3,565	2,840	2,390	0	10	438	686	39	41,442	681	25,778	14,982
	1962	44,942	3,299	2,552	2,196	0	8	347	674	71	41,642	688	27,304	13,649
	1952	44,559	3,273	2,699	2,208	1	6	483	529	45	41,285	817	28,848	11,620
Total, North	1970	177,901	31,911	12,311	10,458	74	815	963	13,075	6,524	145,989	17,563	51,017	77,409
	1962	175,089	31,755	12,448	10,270	80	1,105	992	12,741	6,565	143,334	14,217	58,372	70,743
	1952	170,198	32,341	12,962	10,315	66	1,288	1,292	12,391	6,986	137,857	14,028	66,435	57,393
South Atlantic:														
North Carolina	1970	20,192	1,722	1,349	1,035	0	56	257	307	65	18,470	2,785	8,602	7,082
	1962	19,989	1,720	1,347	1,033	0	56	257	307	65	18,268	2,495	9,503	6,270
	1952	19,582	1,591	1,303	1,019	0	52	231	253	35	17,990	2,584	13,590	1,816
South Carolina	1970	12,410	1,073	840	550	0	0	289	205	26	11,337	2,047	4,995	4,294
	1962	12,170	1,033	857	563	0	0	294	153	23	11,136	2,009	5,637	3,490
	1952	11,883	954	801	562	0	0	239	128	25	10,929	1,650	7,530	1,749
Virginia	1970	15,859	1,671	1,437	1,202	0	0	233	181	53	14,187	1,634	6,701	5,851
	1962	15,752	1,535	1,395	1,202	0	0	192	88	52	14,216	1,454	8,000	4,761
	1952	15,496	1,492	1,355	1,198	0	0	157	86	51	14,003	1,094	10,817	2,091
Total	1970	48,463	4,468	3,627	2,789	0	57	780	694	145	43,995	6,467	20,299	17,228
	1962	47,911	4,289	3,600	2,799	0	57	743	548	140	43,622	5,959	23,140	14,522
	1952	46,962	4,039	3,459	2,780	0	52	627	467	112	42,923	5,328	31,937	5,657
East Gulf:														
Florida	1970	16,231	2,145	1,653	1,035	0	8	609	466	26	14,086	5,216	2,915	5,953
	1962	16,830	2,219	1,640	1,030	2	18	588	539	40	14,610	4,767	3,593	6,249
	1952	18,135	2,251	1,813	1,035	14	36	728	382	56	15,884	4,369	7,280	4,235
Georgia	1970	25,102	1,407	1,326	806	0	0	520	56	24	23,695	4,700	12,110	6,885
	1962	26,298	1,813	1,678	745	0	0	933	111	24	24,484	4,686	14,865	4,933
	1952	23,969	1,684	1,560	643	0	0	916	101	23	22,284	4,246	15,854	2,184
Total	1970	41,334	3,552	2,980	1,842	0	8	1,129	522	50	37,781	9,916	15,026	12,839
	1962	43,128	4,033	3,318	1,775	2	18	1,521	650	64	39,094	9,453	18,458	11,183
	1952	42,104	3,935	3,373	1,678	14	36	1,644	483	79	38,168	8,615	23,134	6,419

See footnote at end of table.

TABLE 2.—*Area of commercial timberland in the United States, by ownership, and section, region, and State, as of December 31, 1952 and 1962, and January 1, 1970* [1]—Continued

[Thousand acres]

Section, region, and State	Year	All ownerships	Public								Private			
			Total public	Federal					State	County and municipal	Total private	Forest industry	Farmer	Miscellaneous private
				Total Federal	National Forest	Bureau of Land Management	Indian	Miscellaneous Federal						
Central Gulf:														
Alabama	1970	21,742	997	795	625	2	0	166	156	45	20,744	3,818	7,628	9,298
	1962	21,742	1,001	799	629	2	0	166	156	45	20,740	3,818	7,631	9,291
	1952	20,756	968	791	616	10	0	165	150	27	19,788	3,138	8,114	8,536
Mississippi	1970	16,891	1,770	1,299	1 118	1	13	166	93	377	15,121	2,505	6,204	6,412
	1962	17,976	1,719	1,267	1,108	4	12	143	55	397	16,257	2,683	5,849	7,724
	1962	16,440	1,718	1,245	1,036	4	10	195	54	419	14,722	2,602	6,958	5,162
Tennessee	1970	12,819	1,286	940	599	0	0	340	324	22	11,533	1,121	5,079	5,333
	1962	13,643	1,199	834	591	0	0	243	344	21	12,444	946	5,745	5,753
	1952	12,301	1,172	833	566	0	0	267	329	10	11,129	750	6,126	4,253
Total	1970	51,453	4,053	3,034	2,344	3	13	673	574	445	47,400	7,444	18,912	21,043
	1962	53,361	3,919	2,900	2,328	6	12	552	555	463	49,441	7,447	19,226	22,768
	1952	49,497	3,858	2,869	2,218	14	10	627	533	456	45,639	6,490	21,198	17,951
West Gulf:														
Arkansas	1970	18,206	2,938	2,682	2,378	1	0	302	236	19	15,268	3,950	4,800	6,517
	1962	21,500	2,846	2,641	2,373	3	0	265	194	11	18,654	4,028	5,613	9,013
	1952	19,265	2,910	2,802	2,326	122	0	354	106	2	16,355	4,118	6,733	5,504
Louisiana	1970	15,342	860	692	551	6	0	134	163	4	14,482	3,180	2,284	9,017
	1962	16,512	885	704	575	11	0	118	176	5	15,627	3,084	2,813	9,728
	1952	16,038	848	667	536	4	0	127	176	5	15,190	3,452	3,189	8,549
Oklahoma	1970	4,817	577	481	233	0	136	111	86	9	4,240	868	1,411	1,959
	1962	4,711	451	391	219	3	140	29	60	0	4,259	969	1,134	2,156
	1952	5,044	448	388	212	7	140	29	60	0	4,595	929	1,586	2,080
Texas	1970	12,924	828	778	625	0	3	149	42	6	12,095	3,496	2,403	6,195
	1962	12,781	753	719	618	0	1	100	32	2	12,028	3,128	2,787	6,112
	1952	13,171	767	736	655	0	4	77	29	2	12,404	3,123	3,533	5,748
Total	1970	51,290	5,204	4,634	3,788	7	140	699	529	39	46,086	11,496	10,899	23,690
	1962	55,504	4,935	4,455	3,785	17	141	512	462	18	50,569	11,209	12,349	27,010
	1952	53,518	4,973	4,593	3,729	133	144	587	371	9	48,545	11,622	15,042	21,881
Total, South	1970	192,542	17,278	14,277	10,764	11	219	3,282	2,321	680	175,263	35,325	65,136	74,801
	1962	199,905	17,177	14,274	10,689	26	229	3,329	2,217	686	182,727	34,069	73,174	75,484
	1952	192,082	16,806	14,295	10,405	161	242	3,486	1,854	656	175,276	32,055	91,311	51,908
Pacific Northwest:														
Alaska: Coastal	1970	5,639	5,609	5,256	5,144	83	25	4	353	0	30	0	0	30
	1962	5,713	5,683	5,505	5,224	252	25	4	178	0	30	0	0	30
	1952	5,713	5,683	5,683	5,224	430	25	4	0	0	30	0	0	30
Oregon:														
Western	1970	14,635	7,752	6,884	4,830	2,046	8	0	735	133	6,883	3,624	1,620	1,639
	1962	14,747	7,820	6,949	4,857	2,084	8	0	733	138	6,927	3,548	1,682	1,697
	1952	14,601	7,730	6,748	4,576	2,150	22	0	732	250	6,871	3,128	1,872	1,871
Eastern	1970	11,038	7,767	7,697	7,173	200	316	8	65	5	3,271	1,582	1,230	459
	1962	11,087	7,803	7,733	7,208	200	317	8	65	5	3,284	1,585	1,236	463
	1952	11,087	8,065	7,995	6,720	200	1,067	8	65	5	3,022	1,533	1,238	251
Summary	1970	25,673	15,519	14,581	12,003	2,246	324	8	800	138	10,154	5,206	2,850	2,098
	1962	25,834	15,623	14,682	12,065	2,284	325	8	798	143	10,211	5,133	2,918	2,160
	1952	25,688	15,795	14,743	11,296	2,350	1,089	8	797	255	9,893	4,661	3,110	2,122
Washington:														
Western	1970	9,991	4,123	2,581	2,321	2	190	68	1,379	163	5,868	3,598	437	1,833
	1962	10,352	4,250	2,662	2,398	2	193	69	1,410	178	6,102	3,686	505	1,911
	1952	10,628	4,349	2,701	2,398	26	199	78	1,442	206	6,279	3,748	537	1,994
Eastern	1970	8,410	5,395	4,652	3,103	46	1,403	100	737	6	3,015	750	1,429	836
	1962	8,508	5,500	4,799	3,196	91	1,439	73	690	11	3,008	652	1,697	659
	1952	8,560	5,537	4,876	3,197	148	1,496	35	653	8	3,023	637	1,759	627
Summary	1970	18,401	9,518	7,233	5,424	48	1,593	168	2,116	169	8,883	4,348	1,866	2,669
	1962	18,860	9,750	7,461	5,594	93	1,632	142	2,100	189	9,110	4,338	2,202	2,570
	1952	19,188	9,886	7,577	5,595	174	1,695	113	2,095	214	9,302	4,385	2,296	2,621
Total	1970	49,713	30,646	27,070	22,571	2,377	1,942	180	3,269	307	19,067	9,554	4,716	4,797
	1962	50,407	31,056	27,648	22,883	2,629	1,982	154	3,076	332	19,351	9,471	5,120	4,760
	1952	50,589	31,364	28,003	22,115	2,954	2,809	125	2,892	469	19,225	9,046	5,406	4,773

See footnote at end of table.

TABLE 2.—*Area of commercial timberland in the United States, by ownership, and section, region, and State, as of December 31, 1952 and 1962, and January 1, 1970* [1]—Continued

[Thousand acres]

Section, region, and State	Year	All ownerships	Public								Private			
			Total public	Federal					State	County and municipal	Total private	Forest industry	Farmer	Miscellaneous private
				Total Federal	National Forest	Bureau of Land Management	Indian	Miscellaneous Federal						
Pacific Southwest:														
California	1970	16,828	8,820	8,743	8,344	275	102	22	72	5	8,008	2,665	1,524	3,819
	1962	17,043	8,924	8,850	8,393	303	114	40	71	3	8,119	2,457	1,598	4,064
	1952	17,127	9,075	8,874	8,372	318	144	40	193	8	8,052	2,167	1,664	4,221
Hawaii	1970	1,081	495	8	0	0	0	8	487	0	585	0	361	223
	1962	1,089	496	9	0	0	0	9	487	0	593	0	366	227
	1952	1,089	496	9	0	0	0	9	487	0	593	0	366	227
Total	1970	17,909	9,315	8,751	8,344	275	102	30	559	5	8,593	2,665	1,885	4,042
	1962	18,132	9,420	8,859	8,393	303	114	49	558	3	8,712	2,457	1,964	4,291
	1952	18,216	9,571	8,883	8,372	318	144	49	680	8	8,645	2,167	2,030	4,448
Total, Pacific Coast	1970	67,622	39,961	35,821	30,915	2,652	2,044	210	3,828	312	27,660	12,219	6,601	8,839
	1962	68,539	40,476	36,507	31,276	2,932	2,096	203	3,634	335	28,063	11,928	7,084	9,051
	1952	68,805	40,935	36,886	30,487	3,272	2,953	174	3,572	477	27,870	11,213	7,436	9,221
Northern Rocky Mountain:														
Idaho	1970	15,192	12,171	11,291	10,731	501	51	7	861	18	3,020	946	777	1,297
	1962	15,881	12,851	11,968	11,406	502	51	7	863	18	3,030	949	779	1,301
	1952	15,539	12,496	11,610	11,045	504	52	7	867	19	3,043	953	782	1,306
Montana	1970	15,983	11,418	10,883	9,732	478	620	53	529	4	4,565	1,055	1,952	1,557
	1962	16,879	12,300	11,764	10,610	479	621	53	531	4	4,579	1,058	1,958	1,562
	1952	16,753	12,154	11,616	10,456	481	624	53	533	4	4,599	1,063	1,966	1,569
South Dakota (West)	1970	1,310	1,029	967	957	5	0	4	62	0	281	17	222	41
	1962	1,310	1,029	966	957	5	0	4	62	0	281	17	223	41
	1952	1,306	1,023	960	951	5	0	4	62	0	283	17	224	41
Wyoming	1970	4,182	3,327	3,216	2,699	393	123	0	110	0	855	54	619	181
	1962	4,720	3,862	3,751	3,232	394	124	0	111	0	857	54	621	181
	1952	4,738	3,876	3,765	3,243	396	124	0	111	0	861	54	624	182
Total	1970	36,668	27,946	26,359	24,120	1,378	795	64	1,563	23	8,722	2,073	3,572	3,076
	1962	38,792	30,043	28,451	26,206	1,382	797	65	1,568	23	8,748	2,079	3,583	3,086
	1952	38,337	29,551	27,952	25,697	1,388	801	65	1,574	23	8,786	2,088	3,598	3,099
Southern Rocky Mountain:														
Arizona	1970	3,689	3,523	3,490	2,347	2	1,140	0	32	1	166	0	81	84
	1962	3,692	3,525	3,492	2,346	2	1,143	0	32	1	166	0	82	84
	1952	3,620	3,453	3,419	2,268	2	1,148	0	32	1	167	0	82	85
Colorado	1970	11,583	8,465	8,231	7,710	413	102	4	188	45	3,118	14	2,635	467
	1962	12,358	9,230	8,996	8,473	414	103	4	189	45	3,127	14	2,643	469
	1952	12,282	9,141	8,905	8,381	416	103	4	190	45	3,141	14	2,655	471
Nevada	1970	128	60	55	55	0	0	0	3	1	68	8	1	58
	1962	141	72	68	68	0	0	0	3	1	68	8	1	58
	1952	142	72	68	68	0	0	0	3	1	69	8	1	58
New Mexico	1970	5,736	3,809	3,638	2,939	76	613	8	171	0	1,927	137	1,549	240
	1962	5,746	3,813	3,642	2,940	76	615	8	171	0	1,932	137	1,554	240
	1952	5,626	3,685	3,513	2,808	76	618	8	172	0	1,941	138	1,561	242
Utah	1970	3,824	3,163	2,924	2,613	154	157	0	239	0	660	0	537	123
	1962	3,871	3,208	2,968	2,656	154	157	0	239	0	662	0	539	123
	1952	3,881	3,216	2,975	2,662	155	158	0	240	0	665	0	541	123
Total	1970	24,963	19,022	18,339	15,666	645	2,013	13	634	47	5,941	160	4,807	974
	1962	25,810	19,851	19,167	16,486	647	2,020	13	636	47	5,959	160	4,821	977
	1952	25,554	19,569	18,881	16,189	650	2,028	13	639	48	5,984	161	4,842	981
Total, Rocky Mountain	1970	61,631	46,968	44,699	39,787	2,024	2,809	78	2,197	71	14,663	2,233	8,379	4,050
	1962	64,603	49,895	47,619	42,692	2,030	2,817	78	2,204	71	14,708	2,240	8,404	4,063
	1952	63,891	49,120	46,834	41,886	2,038	2,830	79	2,214	71	14,771	2,250	8,440	4,080
Total, all regions	1970	499,697	136,120	107,108	91,924	4,761	5,888	4,534	21,422	7,588	363,576	67,341	131,134	165,100
	1962	508,137	139,304	110,849	94,927	5,068	6,248	4,604	20,797	7,657	368,833	62,455	147,035	159,342
	1952	494,978	139,202	110,978	93,094	5,538	7,313	5,032	20,032	8,191	355,775	59,547	173,624	122,604

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[1] Data may not add to totals because of truncating. Zeros indicate no data or negligible amounts.

TABLE 3.—*Area of commercial timberland in the United States, by ownership and stand-size class, section, region, and State, January 1, 1970* [1]

[Thousand acres]

Section, region, and State	Total, all ownerships					National forest				
	Total	Sawtimber stands	Poletimber stands	Seedling sapling	Nonstocked areas	Total	Sawtimber stands	Poletimber stands	Seedling sapling	Nonstocked areas
New England:										
Connecticut	2,169	366	1,168	583	49	0	0	0	0	0
Maine	16,894	6,142	5,339	5,268	143	37	19	15	2	0
Massachusetts	3,491	414	1,669	1,368	38	0	0	0	0	0
New Hampshire	5,020	1,787	2,369	693	171	568	341	131	96	0
Rhode Island	429	14	233	168	13	0	0	0	0	0
Vermont	4,364	1,796	1,524	1,004	40	226	125	63	37	0
Total	32,367	10,521	12,304	9,086	455	832	486	209	135	0
Middle Atlantic:										
Delaware	390	210	128	45	6	0	0	0	0	0
Maryland	2,882	1,791	753	297	40	0	0	0	0	0
New Jersey	2,354	599	794	803	157	0	0	0	0	0
New York	14,489	4,283	2,678	6,201	1,325	0	0	0	0	0
Pennsylvania	17,478	7,665	6,081	3,399	333	488	265	209	7	6
West Virginia	12,092	5,951	3,297	2,596	248	879	543	312	23	0
Total	49,685	20,500	13,732	13,341	2,110	1,367	808	521	30	6
Lake States:										
Michigan	18,800	4,645	8,055	5,506	592	2,422	378	1,223	761	59
Minnesota	16,875	2,360	8,425	4,247	1,841	2,127	337	1,335	295	159
North Dakota	406	63	158	149	34	0	0	0	0	0
South Dakota (East)	223	103	96	19	3	0	0	0	0	0
Wisconsin	14,536	3,098	6,579	4,489	369	1,317	84	749	420	64
Total	50,840	10,272	23,315	14,412	2,841	5,867	800	3,307	1,477	282
Central:										
Illinois	3,680	2,101	934	599	44	214	94	73	29	18
Indiana	3,840	2,065	795	899	79	136	84	23	22	6
Iowa	2,430	942	777	268	442	0	0	0	0	0
Kansas	1,187	681	229	134	141	0	0	0	0	0
Kentucky	11,826	5,633	2,798	3,317	78	531	426	94	4	5
Missouri	14,600	4,002	4,258	3,490	2,848	1,321	318	681	311	10
Nebraska	1,023	253	310	103	355	57	2	27	24	3
Ohio	6,422	1,977	700	3,569	176	129	65	12	32	18
Total	45,008	17,656	10,803	12,383	4,164	2,390	991	912	423	62
Total, North	177,901	58,949	60,156	49,223	9,571	10,458	3,087	4,951	2,067	351
South Atlantic:										
North Carolina	20,192	10,556	4,255	5,193	187	1,035	743	186	102	3
South Carolina	12,410	4,907	3,455	3,649	398	550	368	136	46	0
Virginia	15,859	5,308	5,981	4,472	96	1,202	619	492	75	15
Total	48,463	20,772	13,692	13,315	682	2,789	1,730	815	224	18
East Gulf:										
Florida	16,231	4,987	4,150	4,529	2,563	1,035	419	305	244	66
Georgia	25,102	8,354	4,607	11,426	714	806	492	168	145	0
Total	41,334	13,342	8,758	15,955	3,277	1,842	911	474	389	66
Central Gulf:										
Alabama	21,742	8,885	5,224	7,468	164	625	428	115	81	0
Mississippi	16,891	4,557	3,772	8,427	133	1,118	528	149	440	0
Tennessee	12,819	3,297	4,893	4,595	32	599	257	230	112	0
Total	51,453	16,741	13,889	20,492	330	2,344	1,213	496	634	0
West Gulf:										
Arkansas	18,206	5,443	4,759	7,922	81	2,378	732	863	782	0
Louisiana	15,342	9,459	1,922	3,774	186	551	395	51	99	5
Oklahoma	4,817	1,261	943	2,498	114	233	112	45	75	0
Texas	12,924	7,021	2,184	3,620	97	625	517	37	69	0
Total	51,290	23,185	9,810	17,815	480	3,788	1,758	998	1,026	5
Total, South	192,542	74,041	46,151	67,578	4,771	10,764	5,614	2,784	2,275	89
Pacific Northwest:										
Alaska: Coastal	5,639	5,112	180	300	47	5,144	4,651	173	273	474
Oregon:										
Western	14,635	8,923	1,370	3,576	766	4,830	3,814	459	410	147
Eastern	11,038	7,230	2,458	932	418	7,173	4,731	1,645	632	165
Summary	25,673	16,153	3,828	4,508	1,184	12,003	8,545	2,104	1,042	312

See footnotes at end of table.

TABLE 3.—*Area of commercial timberland in the United States, by ownership and stand-size class, section, region, and State, January 1, 1970* [1]—Continued

[Thousand acres]

Section, region, and State	Total, all ownerships					National forest				
	Total	Sawtimber stands	Poletimber stands	Seedling sapling	Nonstocked areas	Total	Sawtimber stands	Poletimber stands	Seedling sapling	Nonstocked areas
Pacific Northwest—Con.										
Washington:										
Western	9,991	6,217	1,495	2,042	237	2,321	1,741	175	312	93
Eastern	8,410	4,902	1,778	1,240	490	3,103	1,875	679	514	35
Summary	18,401	11,119	3,273	3,282	727	5,424	3,616	854	826	128
Total	49,713	32,384	7,281	8,090	1,958	22,571	16,812	3,131	2,141	487
Pacific Southwest:										
California	16,828	13,616	766	1,194	1,252	8,344	7,240	325	352	427
Hawaii	1,081	321	209	53	497	0	0	0	0	0
Total	17,909	13,937	975	1,247	1,749	8,344	7,240	325	352	427
Total, Pacific Coast	67,622	46,321	8,256	9,337	3,707	30,915	24,052	3,456	2,493	914
Northern Rocky Mountain:										
Idaho [2]	15,192	9,835	1,775	1,879	706	10,731	6,391	1,479	1,375	488
Montana [2]	15,983	9,186	4,466	1,817	380	9,732	5,133	2,887	1,320	258
South Dakota (West) [2]	1,310	708	483	46	15	957	569	284	34	12
Wyoming [2]	4,182	1,990	962	174	128	2,699	1,005	580	116	70
Total	36,668	21,720	7,687	3,917	1,231	24,120	13,100	5,232	2,846	829
Southern Rocky Mountain:										
Arizona [2]	3,689	3,164	182	157	133	2,347	1,882	146	136	129
Colorado [2]	11,583	4,567	2,884	564	1,023	7,710	2,863	1,142	408	752
Nevada [2]	128	110	3	7	7	55	41	3	5	4
New Mexico [2]	5,736	4,655	402	319	227	2,939	2,164	252	167	224
Utah [2]	3,824	2,337	969	263	48	2,613	1,568	686	125	27
Total	24,963	14,834	4,441	1,311	1,440	15,666	8,519	2,230	842	1,138
Total, Rocky Mountain	61,631	36,555	12,129	5,229	2,671	39,787	21,620	7,462	3,689	1,967
Total, all regions	499,697	215,867	126,693	131,368	20,721	91,924	54,374	18,654	10,525	3,322

Section, region, and State	Other public					Forest industry					Farm and miscellaneous private				
	Total	Sawtimber stands	Poletimber stands	Seedling sapling	Nonstocked areas	Total	Sawtimber stands	Poletimber stands	Seedling sapling	nonstocked areas	Total	Sawtimber stands	Poletimber stands	Seedling sapling	Nonstocked areas
New England:															
Connecticut	155	27	103	20	5	3	2	1	0	0	2,011	337	1,064	563	44
Maine	274	31	145	97	0	8,255	3,684	2,892	1,678	0	8,327	2,407	2,286	3,490	142
Massachusetts	399	34	218	143	4	259	140	83	36	0	2,833	240	1,368	1,189	34
New Hampshire	127	44	59	17	5	793	268	397	93	33	3,531	1,132	1,780	485	132
Rhode Island	26	5	17	3	1	0	0	0	0	0	403	9	216	165	12
Vermont	179	63	75	38	0	678	365	218	94	0	3,280	1,241	1,167	833	39
Total	1,160	205	618	320	16	9,988	4,460	3,592	1,903	33	20,386	5,369	7,883	6,727	405
Middle Atlantic:															
Delaware	9	1	7	1	0	29	21	5	3	0	351	187	116	41	6
Maryland	189	104	60	23	2	100	36	44	18	1	2,591	1,650	648	256	37
New Jersey	254	19	124	100	11	4	1	2	1	0	2,096	579	668	702	146
New York	892	278	272	269	71	1,180	594	238	323	23	12,416	3,410	2,167	5,607	1,230
Pennsylvania	2,918	1,235	1,326	334	23	610	241	238	131	0	13,462	5,924	4,307	2,926	303
West Virginia	167	72	50	25	20	530	301	169	55	5	10,515	5,034	2,765	2,492	223
Total	4,429	1,709	1,839	752	127	2,454	1,195	697	531	29	41,433	16,786	10,674	12,026	1,946
Lake States:															
Michigan	4,018	892	2,031	980	112	2,256	1,000	693	553	9	10,102	2,373	4,107	3,210	411
Minnesota	7,261	537	3,412	2,207	1,103	814	110	430	234	38	6,672	1,374	3,247	1,510	540
North Dakota	124	19	48	46	10	0	0	0	0	0	281	43	109	103	24
South Dakota (East)	77	31	41	4	0	0	0	0	0	0	145	72	54	15	3
Wisconsin	3,207	405	1,636	1,101	63	1,368	346	599	418	4	8,643	2,262	3,594	2,549	237
Total	14,688	1,886	7,171	4,340	1,290	4,438	1,457	1,722	1,206	52	25,845	6,127	11,114	7,388	1,216
Central:															
Illinois	52	26	11	10	3	16	16	0	0	0	3,396	1,963	849	560	21
Indiana	224	132	49	42	0	21	12	6	2	0	3,457	1,837	716	830	72
Iowa	34	13	11	3	6	9	3	2	1	1	2,386	925	763	263	434
Kansas	36	20	8	2	4	0	0	0	0	0	1,150	660	221	132	136
Kentucky	289	173	53	55	6	227	148	38	41	0	10,777	4,884	2,612	3,215	65
Missouri	264	60	98	57	49	279	78	80	103	16	12,734	3,544	3,398	3,019	2,772
Nebraska	37	10	16	8	2	0	0	0	0	0	928	240	266	71	349
Ohio	235	119	34	78	3	126	59	14	52	0	5,930	1,732	637	3,405	154
Total	1,175	557	282	258	76	681	318	143	201	18	40,761	15,788	9,465	11,499	4,007
Total, North	21,453	4,360	9,911	5,672	1,510	17,563	7,431	6,155	3,842	133	128,426	44,071	39,137	37,641	7,576

See footnotes at end of table.

TABLE 3.—*Area of commercial timberland in the United States, by ownership and stand-size class, section, region, and State, January 1, 1970* [1]—Continued

[Thousand acres]

Section, region, and State	Other public					Forest industry					Farm and miscellaneous private				
	Total	Saw-timber stands	Pole-timber stands	Seed-ling sapling	Non-stock-ed areas	Total	Saw-timber stands	Pole-timber stands	Seed-ling sapling	Non-stock-ed areas	Total	Saw-timber stands	Pole-timber stands	Seed-ling sapling	Non-stock-ed areas
South Atlantic:															
North Carolina	687	413	122	138	13	2,785	1,323	548	869	43	15,684	8,075	3,398	4,082	127
South Carolina	522	213	132	153	22	2,047	880	511	613	42	9,290	3,446	2,674	2,836	333
Virginia	469	199	199	69	0	1,634	515	503	609	6	12,553	3,974	4,785	3,718	75
Total	1,678	826	455	360	36	6,467	2,719	1,563	2,092	92	37,527	15,496	10,858	10,637	536
East Gulf:															
Florida	1,110	406	203	243	257	5,216	1,538	1,312	1,944	422	8,869	2,624	2,330	2,097	1,817
Georgia	600	253	100	210	36	4,700	1,585	862	2,073	178	18,995	6,023	3,476	8,996	499
Total	1,710	659	303	454	293	9,916	3,123	2,174	4,017	600	27,865	8,647	5,806	11,093	2,317
Central Gulf:															
Alabama	371	201	76	93	0	3,818	1,802	816	1,183	16	16,926	6,453	4,215	6,110	147
Mississippi	651	258	139	241	12	2,505	839	506	1,154	4	12,616	2,931	2,976	6,591	117
Tennessee	686	297	271	117	0	1,121	233	432	456	0	10,412	2,509	3,959	3,910	32
Total	1,709	757	487	452	12	7,444	2,874	1,755	2,793	21	39,955	11,894	11,151	16,612	297
West Gulf:															
Arkansas	560	220	119	214	5	3,950	1,863	745	1,322	19	11,317	2,626	3,032	5,602	56
Louisiana	308	211	20	74	1	3,180	2,196	292	669	22	11,301	6,655	1,557	2,930	157
Oklahoma	343	72	75	191	4	868	408	193	261	5	3,371	667	629	1,969	104
Texas	203	102	22	78	0	3,496	2,510	320	647	17	8,599	3,889	1,804	2,824	80
Total	1,415	607	236	559	11	11,496	6,979	1,551	2,901	64	34,589	13,893	7,024	13,327	398
Total, South	6,514	2,851	1,482	1,826	354	35,325	15,697	7,044	11,805	778	139,938	49,877	34,840	51,670	3,549
Pacific Northwest:															
Alaska: Coastal	465	435	6	24	0	0	0	0	0	0	30	26	1	3	0
Oregon:															
Western	2,922	1,779	234	690	219	3,624	1,793	338	1,325	168	3,259	1,537	339	1,151	232
Eastern	594	407	129	32	26	1,582	1,077	299	131	75	1,689	1,015	385	137	152
Summary	3,516	2,186	363	722	245	5,206	2,870	637	1,456	243	4,948	2,552	724	1,288	384
Washington:															
Western	1,802	1,130	302	340	30	3,598	2,049	540	942	67	2,270	1,297	478	448	47
Eastern	2,292	1,568	345	267	112	750	495	126	101	28	2,265	964	628	358	315
Summary	4,094	2,698	647	607	142	4,348	2,544	666	1,043	95	4,535	2,261	1,106	806	362
Total	8,075	5,319	1,016	1,353	387	9,554	5,414	1,303	2,499	338	9,513	4,839	1,831	2,097	746
Pacific Southwest:															
California	476	339	9	62	66	2,665	2,132	27	318	188	5,343	3,905	405	462	571
Hawaii	495	147	96	24	228	0	0	0	0	0	585	173	113	28	269
Total	971	486	105	86	294	2,665	2,132	27	318	188	5,928	4,078	518	490	840
Total, Pacific Coast	9,046	5,805	1,121	1,439	681	12,219	7,546	1,330	2,817	526	15,441	8,917	2,349	2,587	1,586
Northern Rocky Mountain:															
Idaho [2]	1,440	1,152	114	136	36	946	813	21	89	22	2,074	1,477	160	278	158
Montana [2]	1,685	1,090	408	152	34	1,055	824	181	38	12	3,510	2,138	989	305	76
South Dakota (West) [2]	71	39	30	1	0	17	6	9	0	0	263	92	158	9	3
Wyoming [2]	628	409	144	30	44	54	38	13	1	0	800	537	223	26	13
Total	3,825	2,691	697	320	115	2,073	1,681	226	130	35	6,648	4,246	1,531	619	250
Southern Rocky Mountain:															
Arizona [2]	1,175	1,146	21	3	3	0	0	0	0	0	166	135	14	17	0
Colorado [2]	754	428	298	20	7	14	4	10	0	0	3,103	1,271	1,432	135	264
Nevada [2]	4	4	0	0	0	8	7	0	0	0	60	56	0	1	2
New Mexico [2]	870	828	18	19	3	137	119	8	9	0	1,790	1,543	123	123	0
Utah [2]	550	377	102	60	9	0	0	0	0	0	660	391	180	77	11
Total	3,355	2,786	441	105	24	160	130	18	10	0	5,781	3,398	1,750	355	277
Total, Rocky Mountain	7,181	5,478	1,139	424	139	2,233	1,812	245	140	35	12,429	7,644	3,281	975	528
Total, all regions	44,196	18,494	13,653	9,362	2,685	67,341	32,486	14,775	18,605	1,473	296,235	110,511	79,609	92,874	13,239

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[1] Data may not add to totals because of truncating. Zeros indicate no data or negligible amounts.

[2] Estimates of area subclasses do not include 5.0 million acres of National Forest lands in the Rocky Mountain States that are not included in the base for allowable cut because of such factors as unstable soils, small size of isolated patches and stringers, or special use constraints. Volume and growth data are also excluded for these areas.

TABLE 4.—*Area of commercial timberland in the United States, by ownership and stand-volume class, section, region, and State, January 1, 1970* [1]

[Thousand acres]

Section, region, and State	Total, All Ownerships				National Forest			
	Total	Less than 1,500 bd. ft.	1,500 to 5,000 bd. ft.	More than 5,000 bd. ft.	Total	Less than 1,500 bd. ft.	1,500 to 5,000 bd. ft.	More than 5,000 bd. ft.
New England:								
Connecticut	2, 169	1, 802	319	47	0	0	0	0
Maine	16, 894	7, 580	7, 454	1, 859	37	5	24	7
Massachusetts	3, 491	3, 076	371	43	0	0	0	0
New Hampshire	5, 020	3, 233	1, 429	358	568	366	161	40
Rhode Island	429	415	14	0	0	0	0	0
Vermont	4, 364	2, 464	1, 651	249	226	96	112	17
Total	32, 367	18, 571	11, 239	2, 556	832	468	298	65
Middle Atlantic:								
Delaware	390	179	107	102	0	0	0	0
Maryland	2, 882	1, 404	1, 024	453	0	0	0	0
New Jersey	2, 354	1, 754	438	161	0	0	0	0
New York	14, 489	8, 885	4, 964	639	0	0	0	0
Pennsylvania	17, 478	11, 328	5, 061	1, 089	488	257	192	37
West Virginia	12, 092	5, 316	4, 843	1, 933	879	290	413	175
Total	49, 685	28, 867	16, 439	4, 378	1, 367	547	605	213
Lake States:								
Michigan	18, 800	11, 586	5, 065	2, 148	2, 422	1, 460	673	288
Minnesota	16, 875	14, 512	1, 535	826	2, 127	1, 829	193	104
North Dakota	406	341	37	28	0	0	0	0
South Dakota (East)	223	148	64	10	0	0	0	0
Wisconsin	14, 536	12, 522	1, 162	852	1, 317	1, 135	105	77
Total	50, 840	39, 110	7, 864	3, 865	5, 867	4, 424	972	470
Central:								
Illinois	3, 680	1, 810	1, 420	448	214	105	82	26
Indiana	3, 840	1, 658	1, 405	775	136	46	74	14
Iowa	2, 430	1, 488	598	343	0	0	0	0
Kansas	1, 187	755	368	62	0	0	0	0
Kentucky	11, 826	5, 728	4, 730	1, 368	531	96	330	103
Missouri	14, 600	12, 141	2, 349	109	1, 321	1, 014	306	0
Nebraska	1, 023	651	317	53	57	55	2	0
Ohio	6, 422	3, 125	2, 355	942	129	51	40	38
Total	45, 008	27, 359	13, 545	4, 103	2, 390	1, 369	837	183
Total, North	177, 901	113, 909	49, 088	14, 903	10, 458	6, 810	2, 714	933
South Atlantic:								
North Carolina	20, 192	9, 872	6, 912	3, 407	1, 035	266	527	241
South Carolina	12, 410	6, 046	3, 864	2, 498	550	71	208	271
Virginia	15, 859	7, 818	5, 834	2, 205	1, 202	499	562	141
Total	48, 463	23, 738	16, 612	8, 112	2, 789	836	1, 298	654
East Gulf:								
Florida	16, 231	10, 135	4, 224	1, 871	1, 035	554	333	147
Georgia	25, 102	15, 891	6, 370	2, 840	806	216	346	244
Total	41, 334	26, 026	10, 595	4, 712	1, 842	771	679	391
Central Gulf:								
Alabama	21, 742	12, 225	6, 897	2, 619	625	176	309	140
Mississippi	16, 891	8, 417	6, 151	2, 323	1, 118	288	378	452
Tennessee	12, 819	6, 953	4, 555	1, 310	599	153	285	161
Total	51, 453	27, 595	17, 603	6, 254	2, 344	618	972	753
West Gulf:								
Arkansas	18, 206	8, 760	6, 577	2, 868	2, 378	815	1, 195	367
Louisiana	15, 342	6, 329	5, 769	3, 243	551	136	208	206
Oklahoma	4, 817	3, 901	755	160	233	144	75	14
Texas	12, 924	6, 320	4, 329	2, 274	625	55	182	387
Total	51, 290	25, 311	17, 432	8, 546	3, 788	1, 151	1, 661	974
Total, South	192, 542	102, 672	62, 243	27, 625	10, 764	3, 377	4, 612	2, 773
Pacific Northwest:								
Alaska: Coastal	5, 639	482	216	4, 941	5, 144	446	198	4, 500
Oregon:								
Western	14, 635	3, 398	1, 865	9, 372	4, 830	610	316	3, 904
Eastern	11, 038	2, 148	2, 749	6, 141	7, 173	1, 241	1, 480	4, 452
Summary	25, 673	5, 546	4, 614	15, 513	12, 003	1, 851	1, 796	8, 356
Washington:								
Western	9, 991	2, 351	1, 155	6, 485	2, 321	424	120	1, 777
Eastern	8, 410	1, 553	2, 279	4, 578	3, 103	467	625	2, 011
Summary	18, 401	3, 904	3, 434	11, 063	5, 424	891	745	3, 788
Total	49, 713	9, 932	8, 264	31, 517	22, 571	3, 188	2, 739	16, 644

See footnotes at end of table.

TABLE 4.—*Area of commercial timberland in the United States, by ownership and stand-volume class, section, region, and State, January 1, 1970*[1]—Continued

[Thousand acres]

Section, region, and State	Total, All Ownerships				National Forest			
	Total	Less than 1,500 bd. ft.	1,500 to 5,000 bd. ft.	More than 5,000 bd. ft.	Total	Less than 1,500 bd. ft.	1,500 to 5,000 bd. ft.	More than 5,000 bd. ft.
Pacific Southwest:								
California	16, 828	1, 602	2, 111	13, 115	8, 344	583	470	7, 291
Hawaii	1, 081	757	107	216	0	0	0	0
Total	17, 909	2, 359	2, 218	13, 331	8, 344	583	470	7, 291
Total, Pacific Coast	67, 622	12, 291	10, 482	44, 848	30, 915	3, 771	3, 209	23, 935
Northern Rocky Mountain:								
Idaho [2]	15, 192	2, 592	2, 462	9, 141	10, 731	1, 631	1, 652	6, 452
Montana [2]	15, 983	3, 750	4, 767	7, 332	9, 732	2, 410	2, 410	4, 778
South Dakota (West) [2]	1, 310	544	651	58	957	330	512	58
Wyoming [2]	4, 182	934	1, 431	889	2, 699	451	465	855
Total	36, 668	7, 821	9, 313	17, 422	24, 120	4, 823	5, 040	12, 144
Southern Rocky Mountain:								
Arizona [2]	3, 689	467	1, 133	2, 035	2, 347	409	831	1, 054
Colorado [2]	11, 583	3, 897	1, 537	3, 605	7, 710	1, 864	1, 076	2, 225
Nevada [2]	128	14	25	88	55	7	12	34
New Mexico [2]	5, 736	1, 042	3, 262	1, 300	2, 939	644	1, 202	960
Utah [2]	3, 824	1, 053	957	1, 608	2, 613	611	726	1, 069
Total	24, 963	6, 475	6, 915	8, 637	15, 666	3, 538	3, 849	5, 344
Total, Rocky Mountain	61, 631	14, 296	16, 228	26, 059	39, 787	8, 361	8, 889	17, 488
Total, all regions	499, 697	243, 170	138, 042	113, 437	91, 924	22, 321	19, 425	45, 130

Section, region, and State	Other public				Forest industry				Farm and miscellaneous private			
	Total	Less than 1,500 bd. ft.	1,500 to 5,000 bd. ft.	More than 5,000 bd. ft.	Total	Less than 1,500 bd. ft.	1,500 to 5,000 bd. ft.	More than 5,000 bd. ft.	Total	Less than 1,500 bd. ft.	1,500 to 5,000 bd. ft.	More than 5,000 bd. ft.
New England:												
Connecticut	155	128	24	3	3	1	2	0	2, 011	1, 673	293	44
Maine	274	165	97	11	8, 255	2, 779	4, 375	1, 100	8, 327	4, 631	2, 956	740
Massachusetts	399	365	30	4	259	119	125	15	2, 833	2, 592	216	24
New Hampshire	127	82	36	9	793	510	225	56	3, 531	2, 273	1, 005	251
Rhode Island	26	21	5	0	0	0	0	0	403	394	9	0
Vermont	179	110	59	8	678	300	327	50	3, 280	1, 956	1, 151	172
Total	1, 160	871	252	35	9, 988	3, 710	5, 055	1, 222	20, 386	13, 520	5, 632	1, 232
Middle Atlantic:												
Delaware	9	7	1	1	29	8	11	10	351	164	95	91
Maryland	189	109	53	26	100	82	9	9	2, 591	1, 212	962	417
New Jersey	254	235	14	5	4	3	1	0	2, 096	1, 516	423	156
New York	892	511	343	36	1, 180	525	606	48	12, 416	7, 848	4, 014	553
Pennsylvania	2, 918	1, 943	799	176	610	426	150	34	13, 462	8, 701	3, 919	841
West Virginia	167	82	62	23	530	198	234	98	10, 515	4, 745	4, 134	1, 636
Total	4, 429	2, 888	1, 272	268	2, 454	1, 242	1, 011	200	41, 433	24, 188	13, 548	3, 696
Lake States:												
Michigan	4, 018	2, 539	1, 048	430	2, 256	1, 232	696	327	10, 102	6, 354	2, 646	1, 101
Minnesota	7, 261	6, 244	660	355	814	700	74	39	6, 672	5, 738	607	327
North Dakota	124	104	11	8	0	0	0	0	281	236	25	19
South Dakota (East)	77	50	23	3	0	0	0	0	145	98	40	6
Wisconsin	3, 207	2, 763	256	188	1, 368	1, 178	109	80	8, 643	7, 445	691	506
Total	14, 688	11, 701	2, 000	986	4, 438	3, 111	879	448	25, 845	19, 873	4, 011	1, 961
Central:												
Illinois	52	25	20	6	16	8	6	2	3, 396	1, 670	1, 310	414
Indiana	224	94	84	44	21	8	8	4	3, 457	1, 508	1, 237	711
Iowa	34	21	8	4	9	5	2	1	2, 386	1, 461	587	337
Kansas	36	23	11	2	0	0	0	0	1, 150	732	357	60
Kentucky	289	106	140	42	227	73	118	36	10, 777	5, 450	4, 140	1, 186
Missouri	264	220	42	2	279	232	44	2	12, 734	10, 675	1, 954	104
Nebraska	37	36	1	0	0	0	0	0	928	560	314	53
Ohio	235	72	64	98	126	34	55	37	5, 930	2, 967	2, 194	768
Total	1, 175	600	373	200	681	362	235	83	40, 761	25, 027	12, 098	3, 635
Total, North	21, 453	16, 062	3, 900	1, 491	17, 563	8, 427	7, 182	1, 953	128, 426	82, 610	35, 291	10, 525
South Atlantic:												
North Carolina	687	392	183	111	2, 785	1, 511	769	504	15, 684	7, 701	5, 432	2, 550
South Carolina	522	262	151	108	2, 047	927	573	546	9, 290	4, 786	2, 931	1, 572
Virginia	469	164	212	92	1, 634	812	518	303	12, 553	6, 343	4, 540	1, 669
Total	1, 678	819	547	311	6, 467	3, 251	1, 861	1, 354	37, 527	18, 831	12, 904	5, 792

See footnotes at end of table.

TABLE 4.—*Area of commercial timberland in the United States, by ownership and stand-volume class, section, region, and State, January 1, 1970* [1]—Continued

[Thousand acres]

Section, region, and State	Other public				Forest industry				Farm and miscellaneous private			
	Total	Less than 1,500 bd. ft.	1,500 to 5,000 bd. ft.	More than 5,000 bd. ft.	Total	Less than 1,500 bd. ft.	1,500 to 5,000 bd. ft.	More than 5,000 bd. ft.	Total	Less than 1,500 bd. ft.	1,500 to 5,000 bd. ft.	More than 5,000 bd. ft.
East Gulf:												
Florida	1,110	706	286	117	5,216	3,158	1,374	683	8,869	5,715	2,230	923
Georgia	600	337	162	101	4,700	2,825	1,256	618	18,995	12,512	4,605	1,877
Total	1,710	1,043	448	218	9,916	5,984	2,630	1,301	27,865	18,227	6,836	2,801
Central Gulf:												
Alabama	371	178	130	61	3,818	1,815	1,255	747	16,926	10,055	5,201	1,669
Mississippi	651	206	299	145	2,505	1,055	916	533	12,616	6,866	4,556	1,193
Tennessee	686	272	265	148	1,121	617	380	123	10,412	5,910	3,624	877
Total	1,709	658	695	355	7,444	3,487	2,553	1,403	39,955	22,832	13,382	3,741
West Gulf:												
Arkansas	560	234	193	132	3,950	959	1,657	1,334	11,317	6,751	3,531	1,034
Louisiana	308	133	127	48	3,180	893	1,091	1,195	11,301	5,166	4,341	1,793
Oklahoma	343	295	32	15	868	427	350	90	3,371	3,032	297	40
Texas	203	85	86	31	3,496	834	1,484	1,177	8,599	5,345	2,576	677
Total	1,415	748	439	228	11,496	3,115	4,583	3,798	34,589	20,296	10,747	3,545
Total, South	6,514	3,269	2,131	1,113	35,325	15,838	11,629	7,857	139,938	80,186	43,870	15,880
Pacific Northwest:												
Alaska: Coastal	465	33	17	415	0	0	0	0	30	3	1	26
Oregon:												
Western	2,922	756	431	1,735	3,624	1,065	586	1,973	3,259	967	532	1,760
Eastern	594	73	126	395	1,582	252	539	791	1,689	582	604	503
Summary	3,516	829	557	2,130	5,206	1,317	1,125	2,764	4,948	1,549	1,136	2,263
Washington:												
Western	1,802	401	195	1,206	3,598	971	496	2,131	2,270	555	344	1,371
Eastern	2,292	246	597	1,449	750	93	233	424	2,265	747	824	694
Summary	4,094	647	792	2,655	4,348	1,064	729	2,555	4,535	1,302	1,168	2,065
Total	8,075	1,509	1,366	5,200	9,554	2,381	1,854	5,319	9,513	2,854	2,305	4,354
Pacific Southwest:												
California	476	41	73	362	2,665	291	494	1,880	5,343	687	1,074	3,582
Hawaii	495	347	49	99	0	0	0	0	585	410	58	117
Total	971	388	122	461	2,665	291	494	1,880	5,928	1,097	1,132	3,699
Total, Pacific Coast	9,046	1,897	1,488	5,661	12,219	2,672	2,348	7,199	15,441	3,951	3,437	8,053
Northern Rocky Mountain:												
Idaho [2]	1,440	249	269	920	946	113	124	708	2,074	598	416	1,060
Montana [2]	1,685	365	669	651	1,055	92	296	666	3,510	881	1,392	1,235
South Dakota (West) [2]	71	32	39	0	17	10	6	0	263	171	92	0
Wyoming [2]	628	215	407	5	54	15	31	7	800	252	527	20
Total	3,825	862	1,385	1,577	2,073	232	457	1,383	6,648	1,903	2,429	2,316
Southern Rocky Mountain:												
Arizona [2]	1,175	11	182	981	0	0	0	0	166	46	119	0
Colorado [2]	754	296	96	361	14	8	2	3	3,103	1,728	361	1,013
Nevada [2]	4	0	0	3	8	1	1	5	60	4	10	45
New Mexico [2]	870	133	509	226	137	17	113	5	1,790	246	1,436	107
Utah [2]	550	172	83	294	0	0	0	0	660	269	148	243
Total	3,355	613	872	1,868	160	27	117	14	5,781	2,295	2,075	1,409
Total, Rocky Mountain	7,181	1,476	2,258	3,446	2,233	259	575	1,398	12,429	4,198	4,504	3,726
Total, all regions	44,196	22,705	9,778	11,712	67,341	27,197	21,735	18,408	296,235	170,947	87,103	38,185

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[1] Data may not add to totals because of truncating. Zeros indicate no data or negligible amounts.

[2] See footnote 2, table 3.

TABLE 5.—*Area of commercial timberland in the United States, by ownership and site class, section, region, and State, January 1, 1970* [1]

[Thousand acres]

Section, region, and State	Total, all ownerships						National Forest					
	Total	165 cu. ft. or more	120 to 165 cu. ft.	85 to 120 cu. ft.	50 to 85 cu. ft.	Less than 50 cu. ft.	Total	165 cu. ft. or more	120 to 165 cu. ft.	85 to 120 cu. ft.	50 to 85 cu. ft.	Less than 50 cu. ft.
New England:												
Connecticut	2,169	0	412	409	776	571	0	0	0	0	0	0
Maine	16,894	0	2,386	5,165	5,854	3,487	37	0	4	7	13	11
Massachusetts	3,491	0	664	659	1,250	917	0	0	0	0	0	0
New Hampshire	5,020	0	949	948	1,799	1,324	568	0	41	97	226	203
Rhode Island	429	0	81	81	153	113	0	0	0	0	0	0
Vermont	4,364	0	825	824	1,564	1,151	226	0	16	38	90	81
Total	32,367	0	5,317	8,087	11,398	7,564	832	0	62	142	330	296
Middle Atlantic:												
Delaware	390	0	16	188	157	28	0	0	0	0	0	0
Maryland	2,882	0	119	1,391	1,164	207	0	0	0	0	0	0
New Jersey	2,354	0	96	1,145	943	169	0	0	0	0	0	0
New York	14,489	0	892	1,864	5,632	6,099	0	0	0	0	0	0
Pennsylvania	17,478	0	723	8,439	7,060	1,256	488	0	35	115	306	30
West Virginia	12,092	0	500	5,838	4,885	869	879	0	65	207	551	54
Total	49,865	0	2,347	18,866	19,842	8,628	1,367	0	100	322	858	85
Lake States:												
Michigan	18,800	34	216	1,453	6,962	10,133	2,422	0	0	1	2,128	292
Minnesota	16,875	0	4	906	7,670	8,294	2,127	0	0	16	1,564	545
North Dakota	406	0	0	0	81	324	0	0	0	0	0	0
South Dakota (East)	223	0	0	0	26	196	0	0	0	0	0	0
Wisconsin	14,536	15	168	1,489	5,189	7,674	1,317	1	17	206	733	358
Total	50,840	50	389	3,848	19,929	26,622	5,867	1	17	224	4,426	1,197
Central:												
Illinois	3,680	0	400	924	1,729	626	214	0	0	11	194	9
Indiana	3,840	9	22	149	2,395	1,262	136	0	0	0	115	20
Iowa	2,430	4	14	102	1,494	814	0	0	0	0	0	0
Kansas	1,187	0	0	0	542	644	0	0	0	0	0	0
Kentucky	11,826	0	489	5,710	4,777	850	531	0	43	64	414	8
Missouri	14,600	0	116	584	4,175	9,723	1,321	0	0	0	444	876
Nebraska	1,023	0	0	0	81	941	57	0	0	0	0	57
Ohio	6,422	0	609	1,075	2,652	2,086	129	0	0	5	105	18
Total	45,008	14	1,652	8,544	17,848	16,947	2,390	0	43	83	1,275	989
Total, North	177,901	64	9,706	39,347	69,019	59,763	10,458	1	224	773	6,890	2,568
South Atlantic:												
North Carolina	20,192	349	802	4,214	9,923	4,902	1,035	17	40	144	502	329
South Carolina	12,410	23	274	2,145	7,429	2,538	550	0	25	123	340	61
Virginia	15,859	125	290	1,705	8,961	4,776	1,202	0	7	38	608	549
Total	48,463	498	1,366	8,066	26,314	12,217	2,789	17	73	306	1,450	940
East Gulf:												
Florida	16,231	3	143	2,429	9,486	4,168	1,035	0	3	131	550	349
Georgia	25,102	711	1,631	9,382	11,584	1,792	806	16	38	252	452	46
Total	41,334	715	1,775	11,812	21,070	5,961	1,842	16	42	383	1,003	396
Central Gulf:												
Alabama	21,742	0	2,867	7,011	9,859	2,003	625	0	53	179	315	76
Mississippi	16,891	544	1,466	5,815	7,877	1,187	1,118	55	154	523	365	20
Tennessee	12,819	165	379	2,465	6,497	3,312	599	0	5	104	334	155
Total	51,453	709	4,713	15,293	24,234	6,503	2,344	55	213	808	1,015	251
West Gulf:												
Arkansas	18,206	214	909	3,650	8,303	5,129	2,378	0	2	111	1,299	964
Louisiana	15,342	506	1,435	8,602	3,019	1,778	551	16	67	249	163	55
Oklahoma	4,817	17	0	319	1,330	3,150	233	0	0	14	82	137
Texas	12,924	59	557	5,709	5,353	1,243	625	5	57	342	214	5
Total	51,290	798	2,902	18,280	18,007	11,301	3,788	21	127	718	1,758	1,161
Total, South	192,542	2,721	10,757	53,452	89,626	35,984	10,764	112	456	2,217	5,228	2,750
Pacific Northwest:												
Alaska: Coastal	5,639	144	1,608	2,609	1,161	117	5,144	131	1,535	2,440	945	93
Oregon:												
Western	14,635	3,334	4,810	2,964	2,920	607	4,830	656	1,363	1,172	1,413	226
Eastern	11,038	134	433	2,255	6,304	1,912	7,173	57	211	1,672	4,105	1,128
Summary	25,673	3,468	5,243	5,219	9,224	2,519	12,003	713	1,574	2,844	5,518	1,354
Washington:												
Western	9,991	2,905	3,316	1,859	1,751	160	2,321	390	596	517	721	97
Eastern	8,410	249	602	1,710	4,792	1,057	3,103	112	296	686	1,513	496
Summary	18,401	3,154	3,918	3,569	6,543	1,217	5,424	502	892	1,203	2,234	593
Total	49,713	6,766	10,769	11,397	16,928	3,853	22,571	1,346	4,001	6,487	8,697	2,040

See footnotes at end of table.

TABLE 5.—*Area of commercial timberland in the United States, by ownership and site class, section, region, and State, January 1, 1970* [1]—Continued

[Thousand acres]

Section, region, and State	Total, all ownerships						National Forest					
	Total	165 cu. ft. or more	120 to 165 cu. ft.	85 to 120 cu. ft.	50 to 85 cu. ft.	Less than 50 cu. ft.	Total	165 cu. ft. or more	120 to 165 cu. ft.	85 to 120 cu. ft.	50 to 85 cu. ft.	Less than 50 cu. ft.
Pacific Southwest:												
California	16, 828	1, 789	3, 223	4, 175	5, 976	1, 665	8, 344	459	889	2, 214	3, 821	961
Hawaii	1, 081	1, 081	0	0	0	0	0	0	0	0	0	0
Total	17, 909	2, 870	3, 223	4, 175	5, 976	1, 665	8, 344	459	889	2, 214	3, 821	961
Total, Pacific Coast	67, 622	9, 636	13, 992	15, 572	22, 904	5, 518	30, 915	1, 895	4, 890	8, 701	12, 518	3, 001
Northern Rocky Mountain:												
Idaho [2]	15, 192	854	2, 027	2, 958	3, 939	4, 417	10, 731	781	1, 450	1, 703	2, 118	3, 683
Montana [2]	15, 983	224	1, 496	3, 962	4, 801	5, 365	9, 732	197	1, 435	3, 632	2, 773	1, 559
South Dakota (West) [2]	1, 310	0	0	0	40	1, 213	957	0	0	0	35	865
Wyoming [2]	4, 182	0	0	77	468	2, 710	2, 699	0	0	33	267	1, 470
Total	36, 668	1, 078	3, 523	6, 998	9, 249	13, 707	24, 120	978	2, 885	5, 369	5, 194	7, 579
Southern Rocky Mountain:												
Arizona [2]	3, 689	0	9	165	1, 226	2, 235	2, 347	0	9	61	634	1, 589
Colorado [2]	11, 583	30	40	404	1, 365	7, 199	7, 710	30	33	331	1, 144	3, 626
Nevada [2]	128	0	2	12	28	83	55	0	0	1	6	46
New Mexico [2]	5, 736	0	50	133	1, 663	3, 757	2, 939	0	0	70	846	1, 890
Utah [2]	3, 824	9	1	75	362	3, 170	2, 613	9	1	9	258	2, 129
Total	24, 963	39	104	790	4, 646	16, 446	15, 666	39	44	474	2, 890	9, 282
Total, Rocky Mountain	61, 631	1, 118	3, 627	7, 789	13, 895	30, 153	39, 787	1, 018	2, 930	5, 844	8, 085	16, 861
Total, all regions	499, 697	13, 540	38, 083	116, 161	195, 445	131, 419	91, 924	2, 937	8, 500	17, 535	32, 721	25, 181

Section, region, and State	Other public						Forest industry						Farm and miscellaneous private					
	Total	165 cu. ft. or more	120 to 165 cu. ft.	85 to 120 cu. ft.	50 to 85 cu. ft.	Less than 50 cu. ft.	Total	165 cu. ft. or more	120 to 165 cu. ft.	85 to 120 cu. ft.	50 to 85 cu. ft.	Less than 50 cu. ft.	Total	165 cu. ft. or more	120 to 165 cu. ft.	85 to 120 cu. ft.	50 to 85 cu. ft.	Less than 50 cu. ft.
New England:																		
Connecticut	155	0	11	26	62	56	3	0	0	1	1	1	2, 011	0	401	382	713	514
Maine	274	0	38	48	104	81	8, 255	0	1, 136	2, 852	2, 839	1, 426	8, 327	0	1, 206	2, 257	2, 896	1, 967
Massachusetts	399	0	29	68	159	143	259	0	48	53	86	72	2, 833	0	587	538	1, 005	702
New Hampshire	127	0	9	21	50	45	793	0	147	161	262	222	3, 531	0	751	667	1, 259	852
Rhode Island	26	0	2	4	10	10	0	0	0	0	0	0	403	0	79	77	143	103
Vermont	179	0	12	30	71	64	678	0	126	138	223	190	3, 280	0	669	616	1, 178	815
Total	1, 160	0	102	198	458	400	9, 988	0	1, 458	3, 206	3, 412	1, 911	20, 386	0	3, 693	4, 539	7, 197	4, 955
Middle Atlantic:																		
Delaware	9	0	0	2	6	1	29	0	3	12	8	5	351	0	12	173	143	22
Maryland	189	0	14	44	119	11	100	0	11	44	28	17	2, 591	0	94	1, 302	1, 017	178
New Jersey	254	0	19	60	160	15	4	0	1	2	1	0	2, 096	0	76	1, 083	782	154
New York	892	0	164	103	309	314	1, 180	0	113	115	439	511	12, 416	0	615	1, 644	4, 883	5, 272
Pennsylvania	2, 918	0	216	686	1, 836	180	610	0	68	268	170	104	13, 462	0	403	7, 369	4, 747	941
West Virginia	167	0	12	39	106	10	530	0	59	232	148	91	10, 515	0	363	5, 359	4, 079	713
Total	4, 429	0	425	935	2, 536	532	2, 454	0	255	675	795	729	41, 433	0	1, 566	16, 933	15, 652	7, 281
Lake States:																		
Michigan	4, 018	3	79	280	1, 006	2, 648	2, 256	0	18	120	411	1, 705	10, 102	31	118	1, 050	3, 415	5, 486
Minnesota	7, 261	0	2	332	3, 004	3, 921	814	0	0	38	379	395	6, 672	0	1	517	2, 721	3, 432
North Dakota	124	0	0	0	24	99	0	0	0	0	0	0	281	0	0	0	56	225
South Dakota (East)	77	0	0	0	3	73	0	0	0	0	0	0	145	0	0	0	22	122
Wisconsin	3, 207	1	39	304	1, 208	1, 653	1, 368	0	28	134	491	713	8, 643	11	83	844	2, 756	4, 947
Total	14, 688	5	121	917	5, 248	8, 396	4, 438	0	47	294	1, 282	2, 814	25, 845	42	202	2, 412	8, 972	14, 214
Central:																		
Illinois	52	0	0	13	26	13	16	0	0	0	16	0	3, 396	0	400	899	1, 492	604
Indiana	224	0	1	3	137	82	21	0	0	0	7	13	3, 457	9	20	145	2, 135	1, 146
Iowa	34	0	0	1	21	11	9	0	0	0	5	3	2, 386	4	14	100	1, 467	799
Kansas	36	0	0	0	18	18	0	0	0	0	0	0	1, 150	0	0	0	524	626
Kentucky	289	0	18	119	113	38	227	0	25	99	63	39	10, 777	0	402	5, 426	4, 185	764
Missouri	264	0	0	0	239	25	279	0	2	12	58	205	12, 734	0	114	570	3, 432	8, 617
Nebraska	37	0	0	0	0	37	0	0	0	0	0	0	928	0	0	0	81	846
Ohio	235	0	44	51	65	74	126	0	6	22	53	44	5, 930	0	557	995	2, 428	1, 948
Total	1, 175	0	64	188	620	301	681	0	34	136	204	305	40, 761	14	1, 509	8, 137	15, 747	15, 351
Total, North	21, 453	5	714	2, 239	8, 863	9, 630	17, 563	0	1, 795	4, 311	5, 694	5, 760	128, 426	57	6, 972	32, 022	47, 570	41, 803

See footnotes at end of table.

TABLE 5.—*Area of commercial timberland in the United States, by ownership and site class, section, region, and State, January 1, 1970* [1]—Continued

[Thousand acres]

Section, region, and State	Other public						Forest industry						Farm and miscellaneous private					
	Total	165 cu. ft. or more	120 to 165 cu. ft.	85 to 120 cu. ft.	50 to 85 cu. ft.	Less than 50 cu. ft.	Total	165 cu. ft. or more	120 to 165 cu. ft.	85 to 120 cu. ft.	50 to 85 cu. ft.	Less than 50 cu. ft.	Total	165 cu. ft. or more	120 to 165 cu. ft.	85 to 120 cu. ft.	50 to. 85 cu ft.	Less than 50 cu. ft.
South Atlantic:																		
North Carolina	687	9	20	98	285	274	2, 785	35	81	652	1, 275	741	15, 684	287	659	3, 319	7, 860	3, 557
South Carolina	522	0	4	53	298	166	2, 047	7	49	500	1, 161	328	9, 290	15	195	1, 468	5, 629	1, 981
Virginia	469	1	10	76	276	103	1, 634	3	19	212	1, 006	393	12, 553	120	253	1, 378	7, 070	3, 730
Total	1, 678	10	35	227	860	544	6, 467	46	150	1, 365	3, 443	1, 462	37, 527	423	1, 108	6, 166	20, 559	9, 270
East Gulf:																		
Florida	1, 110	0	2	119	527	461	5, 216	0	33	1, 037	3, 294	851	8, 869	3	104	1, 141	5, 114	2, 505
Georgia	600	17	40	224	240	76	4, 700	179	410	1, 953	1, 810	345	18, 995	497	1, 140	6, 952	9, 080	1, 323
Total	1, 710	17	43	343	767	538	9, 916	179	444	2, 991	5, 104	1, 197	27, 865	501	1, 245	8, 094	14, 195	3, 829
Central Gulf:																		
Alabama	371	0	28	105	193	44	3, 818	0	713	1, 212	1, 505	386	16, 926	0	2, 071	5, 514	7, 844	1, 496
Mississippi	651	60	63	243	254	29	2, 505	110	297	912	1, 039	145	12, 616	317	950	4, 136	6, 218	993
Tennessee	686	16	50	160	335	123	1, 121	40	11	151	626	291	10, 412	107	312	2, 049	5, 201	2, 741
Total	1, 709	77	142	508	783	197	7, 444	151	1, 022	2, 275	3, 171	824	39, 955	424	3, 335	11, 700	19, 264	5, 230
West Gulf:																		
Arkansas	560	6	76	112	227	137	3, 950	67	420	1, 469	1, 733	260	11, 317	141	410	1, 956	5, 043	3, 766
Louisiana	308	25	11	157	44	68	3, 180	107	532	1, 624	668	248	11, 301	357	823	6, 570	2, 142	1, 406
Oklahoma	343	4	0	40	73	225	868	0	0	68	386	413	3, 371	12	0	195	788	2, 374
Texas	203	0	8	80	105	9	3, 496	42	307	2, 004	1, 060	82	8, 599	11	184	3, 282	3, 973	1, 147
Total	1, 415	36	97	390	451	439	11, 496	216	1, 260	5, 166	3, 849	1, 004	34, 589	522	1, 418	12, 005	11, 947	8, 695
Total, South	6, 514	143	317	1, 470	2, 863	1, 720	35, 325	593	2, 876	11, 798	15, 568	4, 488	139, 938	1, 872	7, 106	37, 966	65, 967	27, 025
Pacific Northwest:																		
Alaska: Coastal	465	12	65	155	210	23	0	0	0	0	0	0	30	1	8	14	6	1
Oregon:																		
Western	2, 922	597	1, 294	515	466	50	3, 624	1, 285	1, 140	648	415	136	3, 259	796	1, 013	629	626	195
Eastern	594	30	81	76	334	73	1, 582	47	77	305	902	251	1, 689	0	64	202	963	460
Summary	3, 516	627	1, 375	591	800	123	5, 206	1, 332	1, 217	953	1, 317	387	4, 948	796	1, 077	831	1, 589	655
Washington:																		
Western	1, 802	639	636	301	187	39	3, 598	1, 450	1, 198	545	386	19	2, 270	426	886	496	457	5
Eastern	2, 292	58	122	431	1, 416	265	750	27	52	166	465	40	2, 265	52	132	427	1, 398	256
Summary	4, 094	697	758	732	1, 603	304	4. 348	1, 477	1, 250	711	851	59	4, 535	478	1, 018	923	1, 855	261
Total	8, 075	1, 336	2, 198	1, 478	2, 613	450	9, 554	2, 809	2, 467	1, 664	2, 168	446	9, 513	1, 275	2, 103	1, 768	3, 450	917
Pacific Southwest:																		
California	476	31	75	91	243	36	2, 665	680	706	681	572	26	5, 343	619	1, 553	1, 189	1, 340	642
Hawaii	495	495	0	0	0	0	0	0	0	0	0	0	585	585	0	0	0	0
Total	971	526	75	91	243	36	2, 665	680	706	681	572	26	5, 928	1, 204	1, 553	1, 189	1, 340	642
Total, Pacific Coast	9, 046	1, 862	2, 273	1, 569	2, 856	486	12, 219	3, 489	3, 173	2, 345	2, 740	472	15, 441	2, 479	3, 656	2, 957	4, 790	1, 559
Northern Rocky Mountain:																		
Idaho [2]	1, 440	6	177	455	541	259	946	30	179	243	396	97	2, 074	36	220	556	883	378
Montana [2]	1, 685	6	15	81	522	1, 059	1, 055	8	18	122	473	433	3, 510	11	26	126	1, 031	2, 313
South Dakota (West) [2]	71	0	0	0	1	70	17	0	0	0	0	17	263	0	0	0	3	260
Wyoming [2]	628	0	0	30	136	460	54	0	0	0	3	49	800	0	0	12	60	728
Total	3, 825	13	192	568	1, 201	1, 849	2, 073	38	197	366	874	597	6, 648	47	247	694	1, 978	3, 680
Southern Rocky Mountain:																		
Arizona [2]	1, 175	0	0	101	511	562	0	0	0	0	0	0	166	0	0	2	80	83
Colorado [2]	754	0	1	15	53	684	14	0	0	0	0	13	3, 103	0	4	57	166	2, 874
Nevada [2]	4	0	0	0	1	2	8	0	0	0	2	4	60	0	2	9	18	30
New Mexico [2]	870	0	6	5	198	660	137	0	3	2	43	87	1, 790	0	41	54	575	1, 119
Utah [2]	550	0	0	36	57	456	0	0	0	0	0	0	660	0	0	29	46	585
Total	3, 355	0	8	158	822	2, 365	160	0	3	3	46	106	5, 781	0	47	154	886	4, 692
Total, Rocky Mountain	7, 181	13	201	726	2, 024	4, 215	2, 233	38	200	370	920	703	12, 429	47	294	848	2, 865	8, 373
Total all regions	44, 196	2, 024	3, 506	6, 005	16, 607	16, 052	67, 341	4, 121	8, 046	18, 825	24, 923	11, 424	296, 235	4, 456	18, 030	73, 794	121, 192	78, 761

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[1] Data may not add to totals because of truncating. Zeros indicate no data or negligible amounts.

[2] See footnote 2, table 3.

TABLE 6.—*Net volume of softwood growing stock on commercial timberland in the United States, by ownership and section, region, and State, as of December 31, 1952 and 1962, and January 1, 1970* [1]

[Million cubic feet]

Section, region, and State	Total, all ownerships			National Forest			Other public			Forest industry			Farm and miscellaneous private		
	1970	1962	1952	1970	1962	1952	1970	1962	1952	1970	1962	1952	1970	1962	1952
New England:															
Connecticut	228	202	158	0	0	0	23	20	16	0	0	0	204	181	141
Maine	14,763	12,562	10,092	20	18	14	244	135	112	8,383	5,221	4,193	6,115	7,186	5,772
Massachusetts	769	732	631	0	0	0	95	90	78	63	60	52	611	581	501
New Hampshire	2,901	2,534	2,207	332	290	252	80	70	61	487	426	371	2,000	1,747	1,521
Rhode Island	19	18	15	0	0	0	1	1	1	0	0	0	18	17	13
Vermont	1,507	1,379	1,250	42	38	34	45	41	37	221	203	184	1,197	1,095	993
Total	20,190	17,428	14,354	395	346	302	490	360	306	9,157	5,911	4,800	10,147	10,810	8,944
Middle Atlantic:															
Delaware	229	229	236	0	0	0	4	4	5	15	16	14	209	208	217
Maryland	531	639	716	0	0	0	20	25	28	47	56	63	462	557	624
New Jersey	385	319	249	0	0	0	39	32	25	0	0	0	344	285	223
New York	3,291	3,036	2,748	0	0	0	412	380	344	356	329	298	2,521	2,326	2,106
Pennsylvania	1,600	1,435	1,229	49	44	38	191	172	147	63	57	49	1,294	1,161	994
West Virginia	657	583	492	158	140	118	37	33	27	25	22	19	436	387	327
Total	6,694	6,243	5,673	207	184	156	706	648	578	509	483	444	5,270	4,927	4,493
Lake States:															
Michigan	4,313	3,508	2,369	695	553	270	1,015	801	533	764	661	563	1,837	1,491	1,002
Minnesota	3,896	3,607	2,849	977	905	780	1,861	1,723	1,285	306	283	232	749	694	551
North Dakota	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Dakota (East)	18	15	13	0	0	0	17	13	11	0	0	0	1	2	2
Wisconsin	2,662	2,067	1,550	379	293	136	625	486	485	470	366	110	1,188	922	818
Total	10,891	9,199	6,782	2,052	1,752	1,187	3,519	3,024	2,316	1,541	1,311	905	3,777	3,110	2,374
Central:															
Illinois	19	16	16	13	11	5	0	0	0	1	1	0	4	3	10
Indiana	70	49	27	10	5	3	16	14	14	0	0	0	42	29	9
Iowa	3	4	3	0	0	0	0	0	0	0	0	0	3	4	3
Kansas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kentucky	621	554	492	175	156	139	78	70	62	12	11	10	354	316	280
Missouri	384	316	259	199	163	132	7	7	5	10	9	7	167	137	115
Nebraska	114	98	72	28	25	19	5	4	3	0	0	0	80	69	50
Ohio	123	108	94	8	7	6	11	10	8	4	4	3	98	87	75
Total	1,338	1,148	967	436	368	304	120	107	94	29	26	21	751	646	546
Total, North	39,114	34,020	27,777	3,091	2,652	1,951	4,838	4,141	3,295	11,237	7,732	6,172	19,946	19,494	16,357
South Atlantic:															
North Carolina	8,509	7,938	7,421	317	295	274	301	281	219	1,181	1,102	1,262	6,708	6,258	5,665
South Carolina	6,369	5,324	4,800	649	567	581	326	238	112	1,304	1,017	700	4,088	3,502	3,406
Virginia	4,215	4,343	4,439	171	188	193	183	181	185	710	659	673	3,149	3,314	3,387
Total	19,093	17,606	16,661	1,138	1,051	1,049	812	701	517	3,196	2,778	2,635	13,946	13,075	12,459
East Gulf:															
Florida	6,904	5,870	5,108	754	616	521	510	379	295	2,219	1,860	1,602	3,419	3,013	2,689
Georgia	11,839	10,215	8,924	395	341	297	724	625	545	2,240	1,932	1,688	8,479	7,316	6,391
Total	18,743	16,086	14,032	1,150	957	818	1,234	1,004	841	4,459	3,793	3,291	11,898	10,330	9,081
Central Gulf:															
Alabama	9,232	7,673	5,875	443	368	278	178	147	98	2,555	2,124	1,634	6,055	5,032	3,864
Mississippi	7,188	5,259	3,673	1,074	1,089	578	373	221	341	1,373	1,450	1,419	4,368	2,498	1,334
Tennessee	1,799	1,479	1,226	261	293	219	197	101	101	170	96	79	1,170	987	826
Total	18,220	14,411	10,776	1,778	1,750	1,076	748	470	541	4,100	3,671	3,132	11,593	8,519	6,025
West Gulf:															
Arkansas	6,539	5,810	4,640	1,227	1,148	885	90	54	40	2,685	3,275	2,383	2,535	1,332	1,330
Louisiana	7,595	6,118	4,253	575	472	267	103	110	82	2,420	3,003	2,145	4,496	2,532	1,758
Oklahoma	850	692	539	102	117	73	26	2	2	501	456	359	220	116	104
Texas	7,361	6,061	4,211	948	1,156	679	125	85	49	3,250	2,662	1,901	3,037	2,156	1,582
Total	22,346	18,682	13,645	2,853	2,895	1,905	345	252	175	8,856	9,396	6,788	10,290	6,138	4,775
Total, South	78,404	66,786	55,115	6,921	6,654	4,851	3,140	2,428	2,075	20,613	19,639	15,848	47,729	38,063	32,340

See footnote at end of table.

TABLE 6.—*Net volume of softwood growing stock on commercial timberland in the United States, by ownership and section, region, and State, as of December 31, 1952 and 1962, and January 1, 1970*—Continued

[Million cubic feet]

Section, region, and State	Total, all ownerships			National Forest			Other public			Forest industry			Farm and miscellaneous private		
	1970	1962	1952	1970	1962	1952	1970	1962	1952	1970	1962	1952	1970	1962	1952
Pacific Northwest:															
Alaska: Coastal	34,468	35,485	35,493	31,616	32,548	32,531	2,671	2,749	2,773	0	0	0	181	187	188
Oregon:															
Western	56,823	60,155	64,302	29,674	30,728	30,047	11,295	11,652	12,283	10,304	12,695	16,386	5,550	5,080	5,586
Eastern	24,238	23,989	23,278	17,677	17,373	15,441	1,590	1,692	2,989	2,257	2,539	2,674	2,714	2,385	2,174
Summary	81,061	84,144	87,580	47,351	48,101	45,488	12,885	13,344	15,272	12,561	15,234	19,060	8,264	7,465	7,760
Washington:															
Western	42,336	44,255	45,602	15,804	16,976	17,537	8,315	8,135	7,802	13,463	14,704	16,339	4,754	4,440	3,924
Eastern	17,621	17,312	16,392	8,234	8,385	7,967	4,876	4,953	4,803	1,371	1,203	1,301	3,140	2,771	2,321
Summary	59,957	61,567	61,994	24,038	25,361	25,504	13,191	13,088	12,605	14,834	15,907	17,640	7,894	7,211	6,245
Total	175,486	181,196	185,067	103,005	106,010	103,523	28,747	29,181	30,650	27,395	31,141	36,700	16,339	14,863	14,193
Pacific Southwest:															
California	51,152	53,950	58,006	28,955	29,976	29,590	1,280	1,435	1,892	8,688	9,639	11,268	12,229	12,900	15,256
Hawaii	4	3	3	0	0	0	2	2	2	0	0	0	1	1	1
Total	51,156	53,953	58,009	28,955	29,976	29,590	1,282	1,437	1,894	8,688	9,639	11,268	12,230	12,901	15,257
Total, Pacific Coast	226,643	235,150	243,077	131,960	135,986	133,113	30,029	30,619	32,545	36,083	40,780	47,968	28,569	27,764	29,450
Northern Rocky Mountain:															
Idaho	29,257	29,578	27,736	19,185	20,212	18,893	3,267	3,091	2,991	2,912	2,682	2,497	3,892	3,592	3,353
Montana	28,376	29,044	26,290	18,775	19,612	17,443	2,543	2,493	2,334	2,097	2,116	2,027	4,960	4,822	4,484
South Dakota (West)	1,001	925	825	753	711	648	55	47	39	11	10	8	180	155	128
Wyoming	4,471	5,543	5,260	3,077	4,233	4,074	576	541	490	60	57	51	757	711	643
Total	63,106	65,091	60,111	41,791	44,768	41,060	6,442	6,174	5,856	5,082	4,866	4,585	9,790	9,281	8,609
Southern Rocky Mountain:															
Arizona	4,583	4,688	4,600	3,028	3,077	2,888	1,449	1,502	1,596	0	0	0	105	109	116
Colorado	10,360	11,774	10,925	7,222	8,823	8,204	712	670	618	21	20	18	2,403	2,260	2,083
Nevada	237	244	234	74	86	79	9	8	8	15	15	14	138	134	132
New Mexico	5,735	5,739	5,513	2,810	2,836	2,577	1,346	1,337	1,352	112	112	113	1,464	1,454	1,470
Utah	3,689	3,726	3,656	2,935	2,937	2,784	411	431	476	0	0	0	342	358	395
Total	24,605	26,173	24,931	16,071	17,759	16,534	3,929	3,949	4,051	149	147	146	4,455	4,316	4,198
Total, Rocky Mountain	87,711	91,264	85,043	57,862	62,528	57,595	10,372	10,124	9,907	5,231	5,013	4,732	14,245	13,598	12,808
Total, all regions	431,873	427,221	411,012	199,835	207,821	197,511	48,380	47,314	47,824	73,166	73,165	74,720	110,491	98,920	90,957

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[1] Data may not add to totals because of truncating. Zeros indicate no data or negligible amounts.

TABLE 7.—*Net volume of hardwood growing stock on commercial timberland in the United States, by ownership and section, region, and State, as of December 31, 1952 and 1962, and January 1, 1970*[1]

[Million cubic feet]

Section, region, and State	Total, all ownerships			National Forest			Other public			Forest industry			Farm and miscellaneous private		
	1970	1962	1952	1970	1962	1952	1970	1962	1952	1970	1962	1952	1970	1962	1952
New England:															
Connecticut	1,670	1,596	1,146	0	0	0	176	168	121	2	2	1	1,491	1,425	1,023
Maine	6,490	6,047	5,378	45	21	18	86	59	50	3,284	2,489	2,215	3,073	3,477	3,094
Massachusetts	1,946	1,734	1,240	0	0	0	258	229	164	150	133	95	1,538	1,371	980
New Hampshire	2,245	2,021	1,756	617	556	483	48	43	37	307	276	240	1,271	1,144	994
Rhode Island	246	205	146	0	0	0	18	15	10	0	0	0	228	190	135
Vermont	2,420	2,318	2,227	163	157	151	118	113	109	418	400	385	1,720	1,646	1,582
Total	15,019	13,923	11,894	826	735	653	706	630	494	4,162	3,303	2,938	9,324	9,254	7,809
Middle Atlantic:															
Delaware	428	318	219	0	0	0	8	6	4	29	23	13	390	288	202
Maryland	2,543	2,304	2,053	0	0	0	176	159	141	65	59	52	2,301	2,085	1,858
New Jersey	1,343	1,139	916	0	0	0	68	58	46	2	2	1	1,272	1,079	867
New York	9,226	8,604	7,775	0	0	0	613	572	517	855	797	720	7,757	7,234	6,537
Pennsylvania	18,670	15,602	11,716	707	591	444	3,604	3,012	2,262	816	681	512	13,542	11,316	8,498
West Virginia	13,428	11,080	8,621	1,380	1,139	886	524	432	336	781	645	502	10,741	8,863	6,896
Total	45,639	39,049	31,302	2,088	1,730	1,330	4,996	4,241	3,308	2,550	2,209	1,803	36,004	30,868	24,860
Lake States:															
Michigan	12,245	10,387	7,609	1,189	948	578	2,492	2,072	1,418	1,604	1,410	1,174	6,959	5,957	4,438
Minnesota	7,830	6,194	4,399	1,021	808	570	3,012	2,382	1,652	373	295	213	3,423	2,708	1,963
North Dakota	276	265	257	0	0	0	85	82	79	0	0	0	191	182	178
South Dakota (East)	83	71	73	0	0	0	15	12	12	0	0	0	67	58	60
Wisconsin	8,748	7,729	6,411	762	672	564	1,654	1,460	1,192	841	742	423	5,490	4,854	4,231
Total	29,184	24,648	18,751	2,973	2,428	1,713	7,259	6,011	4,355	2,818	2,447	1,811	16,131	13,761	10,872
Central:															
Illinois	2,308	2,328	2,386	108	109	69	43	44	35	6	6	15	2,149	2,168	2,266
Indiana	3,536	3,319	2,876	150	116	50	241	222	185	20	21	20	3,124	2,959	2,619
Iowa	1,803	1,570	1,356	1	1	1	24	19	18	6	5	5	1,771	1,545	1,331
Kansas	533	478	476	0	0	0	22	19	16	0	0	0	511	458	460
Kentucky	7,925	6,835	5,859	425	366	314	245	211	181	231	199	171	7,023	6,057	5,192
Missouri	6,111	4,903	3,836	700	564	406	114	86	75	118	89	78	5,177	4,162	3,277
Nebraska	391	361	284	0	0	0	9	8	6	0	0	0	382	352	277
Ohio	4,109	3,760	3,152	93	85	72	243	222	186	113	103	86	3,658	3,348	2,807
Total	26,719	23,556	20,228	1,479	1,242	912	943	834	705	497	426	377	23,798	21,052	18,233
Total, North	116,563	101,177	82,177	7,368	6,137	4,608	13,906	11,717	8,863	10,028	8,386	6,929	85,260	74,936	61,775
South Atlantic:															
North Carolina	11,171	10,391	9,547	960	893	730	253	235	153	1,154	1,073	1,363	8,803	8,188	7,299
South Carolina	6,330	5,652	5,411	275	236	195	193	151	75	1,313	1,062	650	4,547	4,202	4,489
Virginia	10,955	10,171	9,010	939	817	724	361	213	189	884	821	727	8,769	8,318	7,369
Total	28,456	26,215	23,968	2,175	1,947	1,649	808	601	418	3,352	2,957	2,742	22,120	20,709	19,158
East Gulf:															
Florida	3,984	3,706	3,517	171	129	102	128	100	75	1,302	1,120	1,053	2,382	2,357	2,285
Georgia	7,855	7,624	7,467	560	544	533	228	220	216	1,075	1,043	1,022	5,991	5,815	5,695
Total	11,839	11,331	10,984	731	673	636	356	320	292	2,378	2,164	2,075	8,373	8,173	7,980
Central Gulf:															
Alabama	6,777	6,774	6,476	190	190	146	123	123	82	1,071	1,071	887	5,392	5,390	5,360
Mississippi	6,689	6,281	6,370	342	394	143	335	187	199	943	970	648	5,067	4,728	5,380
Tennessee	8,596	7,819	7,023	475	387	275	526	402	377	733	563	436	6,860	6,465	5,932
Total	22,062	20,875	19,871	1,007	972	566	986	714	659	2,748	2,604	1,972	17,319	16,584	16,673
West Gulf:															
Arkansas	8,826	9,256	9,468	1,076	997	656	444	562	359	1,910	2,197	1,366	5,395	5,498	7,085
Louisiana	6,006	6,395	6,756	107	113	89	138	109	114	1,197	1,186	1,183	4,563	4,986	5,369
Oklahoma	798	827	839	20	55	42	70	30	30	135	130	128	571	610	637
Texas	3,121	3,353	3,680	106	145	115	53	23	18	851	1,001	969	2,109	2,183	2,576
Total	18,753	19,832	20,745	1,311	1,310	903	706	726	523	4,095	4,516	3,647	12,639	13,279	15,669
Total, South	81,112	78,255	75,569	5,226	4,903	3,755	2,857	2,363	1,894	12,574	12,243	10,437	60,453	58,745	59,481

See footnotes at end of table.

TABLE 7.—*Net volume of hardwood growing stock on commercial timberland in the United States, by ownership and section, region, and State, as of December 31, 1952 and 1962, and January 1, 1970* [1]—Continued

[Million cubic feet]

Section, region, and State	Total, all ownerships			National Forest			Other public			Forest industry			Farm and miscellaneous private		
	1970	1962	1952	1970	1962	1952	1970	1962	1952	1970	1962	1952	1970	1962	1952
Pacific Northwest:															
Alaska: Coastal	298	300	298	274	275	273	23	23	23	0	0	0	1	1	1
Oregon:															
Western	5,994	5,119	4,192	925	859	714	1,098	829	627	1,410	1,210	939	2,561	2,221	1,912
Eastern	38	35	31	11	10	9	2	2	3	1	1	1	24	22	18
Summary	6,032	5,154	4,223	936	869	723	1,100	831	630	1,411	1,211	940	2,585	2,243	1,930
Washington:															
Western	4,987	3,944	2,716	128	113	90	932	697	453	1,854	1,453	950	2,073	1,681	1,223
Eastern	171	157	143	33	33	31	58	57	54	17	11	10	63	56	48
Summary	5,158	4,101	2,859	161	146	121	990	754	507	1,871	1,464	960	2,136	1,737	1,271
Total	11,488	9,555	7,380	1,371	1,290	1,117	2,113	1,608	1,160	3,282	2,675	1,900	4,722	3,981	3,202
Pacific Southwest:															
California	3,099	2,975	2,828	1,255	1,286	1,276	205	190	218	576	449	336	1,063	1,050	998
Hawaii	234	219	219	0	0	0	111	98	98	0	0	0	123	120	120
Total	3,333	3,194	3,047	1,255	1,286	1,276	316	288	316	576	449	336	1,186	1,170	1,118
Total, Pacific Coast	14,822	12,749	10,427	2,626	2,576	2,393	2,429	1,897	1,476	3,858	3,124	2,236	5,909	5,152	4,321
Northern Rocky Mountain:															
Idaho [2]	239	224	199	84	85	76	48	45	41	27	24	21	78	68	59
Montana [2]	273	265	244	33	32	27	61	59	55	6	6	5	172	166	155
South Dakota (West) [2]	6	4	3	0	0	0	1	0	0	0	0	0	4	3	2
Wyoming [2]	201	207	187	51	67	61	57	53	48	3	3	2	89	83	74
Total	721	701	634	168	185	165	169	159	145	37	34	30	346	322	292
Southern Rocky Mountain:															
Arizona [2]	226	206	173	139	126	102	47	44	39	0	0	0	39	36	32
Colorado [2]	1,907	2,030	1,786	1,132	1,315	1,147	149	138	123	0	0	0	624	576	515
Nevada [2]	12	14	12	12	14	12	0	0	0	0	0	0	0	0	0
New Mexico [3]	600	544	456	242	222	177	31	28	24	17	15	13	310	278	240
Utah [2]	1,038	989	896	604	592	545	145	132	117	0	0	0	288	264	233
Total	3,785	3,784	3,325	2,130	2,269	1,985	374	344	305	17	15	13	1,262	1,155	1,021
Total, Rocky Mountain	4,507	4,486	3,960	2,299	2,455	2,150	544	503	450	54	49	44	1,608	1,478	1,314
Total, all regions	217,005	196,669	172,134	17,520	16,072	12,908	19,736	16,481	12,686	26,516	23,803	19,647	153,231	140,313	126,892

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[1] Data may not add to totals because of truncating. Zeros indicate no data or negligible amounts.

[2] See footnote 2, table 3.

TABLE 8.—*Net volume of softwood sawtimber on commercial timberland in the United States, by ownership and section, region, and State, as of December 31, 1952 and 1962, and January 1, 1970* [1]

[Million board feet, International ¼-inch log rule]

Section, region, and State	Total, all ownerships			National Forest			Other public			Forest industry			Farm and miscellaneous private		
	1970	1962	1952	1970	1962	1952	1970	1962	1952	1970	1962	1952	1970	1962	1952
New England:															
Connecticut	345	304	263	0	0	0	30	27	23	0	0	0	315	276	239
Maine	23,455	20,144	17,233	40	38	36	279	234	228	12,614	8,474	7,236	10,521	11,396	9,731
Massachusetts	1,324	1,309	1,299	0	0	0	129	127	126	112	110	109	1,083	1,070	1,062
New Hampshire	6,861	5,977	5,381	749	653	588	194	169	152	1,166	1,015	914	4,751	4,138	3,725
Rhode Island	25	27	29	0	0	0	1	2	2	0	0	0	23	25	26
Vermont	2,800	2,775	3,270	76	75	89	107	107	126	402	398	470	2,213	2,192	2,584
Total	34,813	30,536	27,475	866	767	713	743	667	659	14,295	10,000	8,731	18,906	19,100	17,370
Middle Atlantic:															
Delaware	459	491	539	0	0	0	5	6	6	34	40	36	419	444	495
Maryland	1,281	1,504	1,472	0	0	0	49	57	56	106	124	122	1,125	1,321	1,293
New Jersey	748	588	406	0	0	0	67	52	36	1	1	0	679	533	368
New York	7,273	6,769	6,310	0	0	0	617	574	535	800	745	694	5,855	5,449	5,079
Pennsylvania	3,433	3,223	2,988	133	125	116	512	481	446	133	125	116	2,654	2,491	2,309
West Virginia	1,835	1,646	1,394	508	455	386	133	119	101	66	59	50	1,127	1,010	855
Total	15,032	14,221	13,109	641	581	502	1,386	1,292	1,183	1,143	1,096	1,021	11,861	11,250	10,402
Lake States:															
Michigan	11,025	8,792	5,929	1,225	1,174	428	2,672	2,001	1,334	2,511	2,154	1,836	4,617	3,461	2,329
Minnesota	8,041	6,559	4,968	1,511	1,233	1,006	4,004	3,266	2,330	651	531	480	1,874	1,528	1,151
North Dakota	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Dakota (East)	58	46	42	0	0	0	52	42	39	0	0	0	5	4	3
Wisconsin	6,963	5,563	4,495	828	662	346	1,496	1,196	1,609	1,503	1,201	301	3,135	2,503	2,238
Total	26,088	20,960	15,434	3,565	3,069	1,781	8,225	6,505	5,312	4,665	3,887	2,617	9,632	7,497	5,722
Central:															
Illinois	24	28	31	5	5	1	0	0	0	7	7	3	12	14	27
Indiana	183	141	78	10	9	1	53	47	47	0	0	0	119	83	28
Iowa	10	7	6	0	0	0	0	0	0	0	0	0	10	6	5
Kansas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kentucky	1,968	1,765	1,607	502	450	410	20	18	16	58	52	47	1,387	1,244	1,132
Missouri	1,071	813	613	591	500	311	20	15	11	28	21	17	432	277	274
Nebraska	489	388	260	111	79	64	24	18	13	0	0	0	353	290	181
Ohio	377	342	326	23	21	20	36	32	31	19	17	17	297	269	257
Total	4,126	3,485	2,921	1,244	1,066	808	154	133	120	114	99	84	2,613	2,185	1,907
Total, North	80,061	69,202	58,939	6,318	5,484	3,806	10,510	8,599	7,276	20,219	15,083	12,454	43,013	40,034	35,402
South Atlantic:															
North Carolina	28,611	25,878	23,715	1,085	981	877	986	892	699	4,439	4,014	4,031	22,100	19,989	18,106
South Carolina	20,381	16,811	15,449	2,399	2,023	1,455	1,036	724	479	3,985	3,124	2,782	12,960	10,939	10,731
Virginia	11,884	11,691	11,616	621	687	683	525	566	562	2,186	2,022	2,009	8,551	8,415	8,361
Total	60,877	54,380	50,780	4,106	3,692	3,015	2,548	2,182	1,741	10,611	9,161	8,823	43,612	39,343	37,199
East Gulf:															
Florida	19,966	16,789	14,707	2,154	1,670	1,447	1,694	1,223	936	6,280	5,288	4,610	9,836	8,607	7,712
Georgia	33,868	29,873	26,839	1,404	1,239	1,114	2,636	2,324	2,087	6,414	5,658	5,083	23,412	20,651	18,553
Total	53,834	46,662	41,546	3,559	2,909	2,561	4,330	3,547	3,024	12,694	10,946	9,693	33,249	29,259	26,266
Central Gulf:															
Alabama	34,874	28,306	21,273	1,912	1,552	1,101	630	511	301	10,360	8,409	6,275	21,970	17,832	13,596
Mississippi	28,079	20,008	13,832	5,133	5,030	2,899	1,474	760	1,180	5,959	5,254	6,413	15,511	8,964	3,340
Tennessee	4,699	3,996	3,412	863	929	814	621	285	309	446	275	257	2,767	2,505	2,030
Total	67,652	52,310	38,517	7,910	7,511	4,814	2,726	1,557	1,790	16,766	13,938	12,945	40,248	29,302	18,966
West Gulf:															
Arkansas	25,251	22,022	17,408	4,378	4,051	3,346	374	195	158	11,686	13,638	11,676	8,812	4,138	2,228
Louisiana	35,011	28,271	19,560	2,781	2,291	1,292	475	452	325	11,902	13,023	10,048	19,852	12,505	7,895
Oklahoma	2,788	2,295	1,771	383	503	307	101	8	7	1,715	1,463	1,241	587	321	216
Texas	30,459	24,457	15,989	4,632	5,390	2,759	516	272	149	14,673	11,578	8,071	10,637	7,217	5,010
Total	93,511	77,045	54,728	12,175	12,235	7,704	1,467	927	636	39,977	39,702	31,036	39,890	24,181	15,349
Total, South	275,875	230,397	185,571	27,751	26,348	18,095	11,072	8,214	195	80,050	73,748	62,499	157,001	112,086	97,781

See footnotes at end of table.

TABLE 8.—*Net volume of softwood sawtimber on commercial timberland in the United States, by ownership and section, region, and State, as of December 31, 1952 and 1962, and January 1, 1970*[1]—Continued

[Million board feet, International ¼-inch log rule]

Section, region, and State	Total, all ownerships			National Forest			Other public			Forest industry			Farm and miscellaneous private		
	1970	1962	1952	1970	1962	1952	1970	1962	1952	1970	1962	1952	1970	1962	1952
Pacific Northwest:															
Alaska: Coastal	178, 101	182, 224	183, 928	163, 361	167, 143	168, 706	13, 801	14, 120	14, 252	0	0	0	928	960	969
Oregon:															
Western	327, 862	356, 072	391, 046	172, 354	180, 645	178, 851	67, 119	70, 879	76, 053	60, 814	78, 459	105, 732	27, 575	26, 089	30, 410
Eastern	106, 809	111, 316	115, 304	81, 211	83, 467	78, 260	7, 050	7, 813	14, 320	9, 457	11, 440	13, 767	9, 091	8, 596	9, 857
Summary	434, 671	467, 388	506, 350	253, 565	264, 112	257, 111	74, 169	78, 692	90, 373	70, 271	89, 899	119, 499	36, 666	34, 685	39, 367
Washington:															
Western	234, 479	251, 635	267, 908	95, 294	103, 339	107, 965	43, 128	43, 990	44, 208	74, 828	84, 264	97, 340	21, 229	20, 042	18, 395
Eastern	75, 323	76, 703	75, 855	38, 659	40, 496	39, 444	21, 110	22, 014	21, 957	5, 406	5, 145	6, 161	10, 148	9, 048	8, 293
Summary	309, 802	328, 338	343, 763	133, 953	143, 835	147, 409	64, 238	66, 004	66, 165	80, 234	89, 409	103, 501	31, 377	29, 090	26, 688
Total	922, 574	977, 950	1, 034, 041	550, 879	575, 090	573, 226	152, 208	158, 816	170, 790	150, 505	179, 308	223, 000	68, 981	64, 735	67, 024
Pacific Southwest:															
California	271, 653	296, 617	331, 145	161, 514	172, 155	173, 999	6, 786	7, 844	10, 799	43, 405	50, 539	62, 185	59, 948	66, 079	84, 162
Hawaii	18	16	16	0	0	0	11	10	10	0	0	0	6	5	5
Total	271, 671	296, 633	331, 161	161, 514	172, 155	173, 999	6, 797	7, 854	10, 809	43, 405	50, 539	62, 185	59, 954	66, 084	84, 167
Total, Pacific Coast	1, 194, 245	1, 274, 583	1, 365, 202	712, 393	747, 245	747, 225	159, 006	166, 671	181, 600	193, 910	229, 847	285, 185	128, 935	130, 819	151, 191
Northern Rocky Mtn.:															
Idaho [2]	130, 986	136, 606	132, 869	87, 366	93, 731	89, 475	14, 425	14, 471	15, 060	13, 290	12, 902	12, 831	15, 904	15, 500	15, 502
Montana [2]	100, 925	106, 702	100, 237	64, 748	69, 792	64, 182	9, 219	9, 378	9, 141	9, 526	9, 964	9, 912	17, 431	17, 567	17, 001
South Dakota (West) [2]	3, 434	3, 510	3, 516	2, 624	2, 765	2, 852	194	179	159	38	35	31	576	530	472
Wyoming [2]	16, 040	20, 489	19, 948	11, 325	16, 032	15, 891	1, 951	1, 844	1, 679	220	208	189	2, 543	2, 404	2, 188
Total	251, 387	267, 307	256, 570	166, 065	182, 320	172, 400	25, 790	25, 874	26, 040	23, 075	23, 110	22, 964	36, 456	36, 002	35, 164
Southern Rocky Mtn.:															
Arizona [2]	20, 902	22, 218	22, 714	13, 816	14, 707	14, 494	6, 727	7, 130	7, 803	0	0	0	358	380	416
Colorado [2]	42, 633	49, 965	47, 598	31, 434	39, 329	37, 598	2, 567	2, 438	2, 292	74	70	66	8, 556	8, 126	7, 640
Nevada [2]	1, 319	1, 362	1, 327	373	441	411	51	49	49	86	84	83	808	787	782
New Mexico [2]	24, 054	25, 168	25, 422	12, 181	12, 847	12, 254	5, 876	6, 098	6, 517	430	446	477	5, 566	5, 776	6, 173
Utah [2]	14, 809	15, 324	15, 542	11, 710	11, 904	11, 520	1, 685	1, 860	2, 188	0	0	0	1, 413	1, 559	1, 834
Total	103, 719	114, 037	112, 603	69, 516	79, 228	76, 277	16, 908	17, 577	18, 851	591	601	627	16, 703	16, 629	16, 847
Total, Rocky Mountains	355, 106	381, 344	369, 173	235, 581	261, 548	248, 677	42, 699	43, 452	44, 892	23, 666	23, 711	23, 592	53, 159	52, 632	52, 011
Total, all regions	1, 905, 289	1, 955, 527	1, 978, 886	982, 045	1, 040, 625	1, 017, 803	223, 287	226, 938	240, 964	317, 846	342, 391	383, 731	382, 110	345, 572	336, 387

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[1] Data may not add to totals because of truncating. Zeros indicate no data or negligible amounts.

[2] See footnote 2, table 3.

TABLE 9.—*Net volume of hardwood sawtimber on commercial timberland in the United States, by ownership and section, region, and State, as of December 31, 1952 and 1962, and January 1, 1970* [1]

[Million board feet, International ¼-inch log rule]

Section, region, and State	Total, all ownerships			National Forest			Other public			Forest industry			Farm and miscellaneous private		
	1970	1962	1952	1970	1962	1952	1970	1962	1952	1970	1962	1952	1970	1962	1952
New England:															
Connecticut	2,265	2,106	1,596	0	0	0	192	178	135	4	4	3	2,068	1,923	1,457
Maine	11,063	10,556	9,807	104	41	41	104	97	98	6,450	4,420	4,102	4,404	5,997	5,564
Massachusetts	1,803	1,660	1,360	0	0	0	162	149	122	153	141	115	1,487	1,369	1,121
New Hampshire	3,178	2,995	3,075	1,162	1,095	1,124	61	58	59	383	361	371	1,571	1,480	1,519
Rhode Island	167	146	136	0	0	0	21	18	17	0	0	0	145	127	118
Vermont	3,977	4,124	4,626	403	421	473	189	196	220	730	760	852	2,654	2,745	3,080
Total	22,456	21,587	20,600	1,670	1,558	1,639	731	698	653	7,722	5,687	5,444	12,332	13,643	12,862
Middle Atlantic:															
Delaware	900	734	573	0	0	0	10	8	6	68	60	39	822	665	527
Maryland	5,680	5,291	5,042	0	0	0	306	284	271	57	53	51	5,317	4,952	4,719
New Jersey	3,527	2,975	2,325	0	0	0	98	83	65	7	6	4	3,421	2,885	2,255
New York	17,706	16,971	16,096	0	0	0	1,216	1,165	1,105	1,994	1,911	1,813	14,495	13,893	13,177
Pennsylvania	26,182	21,908	16,670	1,096	917	697	5,033	4,211	3,204	1,100	921	700	18,951	15,857	12,066
West Virginia	33,850	28,538	22,716	3,052	2,573	2,048	1,193	1,005	800	1,945	1,639	1,305	27,660	23,319	18,561
Total	87,848	76,417	63,422	4,148	3,490	2,746	7,857	6,759	5,454	5,173	4,592	3,914	70,668	61,574	51,307
Lake States:															
Michigan	27,061	22,339	16,764	1,864	1,619	865	5,470	4,377	3,070	4,665	3,948	3,369	15,061	12,394	9,458
Minnesota	12,025	8,958	6,354	815	607	312	3,803	2,833	1,782	516	385	288	6,889	5,132	3,971
North Dakota	563	524	509	0	0	0	173	162	156	0	0	0	390	361	352
South Dakota (East)	280	228	204	0	0	0	38	31	27	0	0	0	242	196	176
Wisconsin	15,332	13,582	10,260	806	706	687	1,987	1,765	1,672	1,683	1,494	707	10,855	9,616	7,192
Total	55,263	45,631	34,091	3,486	2,933	1,864	11,473	9,170	6,709	6,865	5,827	4,366	33,438	27,700	21,151
Central:															
Illinois	7,809	8,548	9,488	328	359	245	139	152	133	22	24	61	7,319	8,012	9,049
Indiana	11,025	10,258	8,754	354	300	165	809	733	606	65	67	64	9,796	9,157	7,918
Iowa	6,586	5,709	5,053	5	5	4	86	73	66	24	21	19	6,470	5,608	4,963
Kansas	1,902	1,760	1,706	0	0	0	86	78	62	0	0	0	1,816	1,682	1,644
Kentucky	28,231	24,382	21,311	972	839	734	1,027	887	775	981	847	741	25,250	21,807	19,060
Missouri	14,977	12,600	10,828	1,091	1,117	606	236	191	177	228	175	171	13,421	11,116	9,873
Nebraska	1,502	1,441	1,070	0	0	0	41	40	29	0	0	0	1,460	1,401	1,041
Ohio	14,201	13,148	11,039	343	318	267	882	817	686	407	377	316	12,567	11,635	9,768
Total	86,237	77,848	69,251	3,095	2,940	2,021	3,309	2,973	2,537	1,730	1,513	1,373	78,102	70,421	63,319
Total, North	251,806	221,484	187,364	12,400	10,921	8,271	23,372	19,601	15,353	21,492	17,621	15,099	194,542	173,339	148,640
South Atlantic:															
North Carolina	29,516	27,998	26,327	2,808	2,664	2,014	764	724	424	3,015	2,860	3,762	22,927	21,748	20,126
South Carolina	16,051	14,305	14,259	681	548	409	467	371	260	3,567	2,804	2,375	11,336	10,581	11,213
Virginia	27,342	25,480	22,827	2,494	1,883	1,687	873	507	453	2,074	2,280	2,043	21,900	20,809	18,642
Total	72,910	67,783	63,413	5,984	5,095	4,110	2,104	1,602	1,138	8,657	7,944	8,180	56,164	53,139	49,982
East Gulf:															
Florida	10,498	9,541	9,207	425	308	249	311	232	192	3,449	3,174	3,088	6,312	5,824	5,676
Georgia	18,893	19,519	20,259	1,625	1,679	1,741	522	540	561	2,653	2,740	2,844	14,092	14,558	15,111
Total	29,392	29,060	29,466	2,050	1,987	1,991	834	733	754	6,103	5,915	5,932	20,404	20,383	20,787
Central Gulf:															
Alabama	17,894	18,295	18,194	503	515	421	358	366	247	2,921	2,987	2,735	14,110	14,426	14,791
Mississippi	16,652	16,081	16,854	905	874	314	1,006	525	508	2,634	1,703	1,295	12,106	12,979	14,737
Tennessee	21,641	19,431	18,128	1,232	1,070	784	1,545	1,075	975	1,960	1,293	1,018	16,902	15,991	15,350
Total	56,188	53,807	53,176	2,642	2,460	1,519	2,909	1,967	1,730	7,516	5,983	5,048	43,119	43,396	44,878
West Gulf:															
Arkansas	21,134	22,828	25,031	2,381	2,509	1,509	1,430	1,851	1,086	5,254	5,982	3,729	12,067	12,486	18,707
Louisiana	18,985	20,594	22,397	293	269	209	424	407	402	4,168	3,488	3,694	14,099	16,430	18,092
Oklahoma	1,701	1,844	1,988	31	97	74	143	70	74	266	244	261	1,259	1,433	1,579
Texas	7,662	8,614	10,025	273	586	447	141	104	85	2,233	2,424	2,512	5,013	5,500	6,981
Total	49,483	53,880	59,441	2,980	3,461	2,239	2,139	2,432	1,647	11,923	12,138	10,196	32,440	35,849	45,359
Total, South	207,974	204,530	205,496	13,657	13,004	9,860	7,988	6,775	5,270	34,200	31,981	29,358	152,129	152,768	161,007

See footnotes at end of table.

TABLE 9.—*Net volume of hardwood sawtimber on commercial timberland in the United States, by ownership and section, region, and State, as of December 31, 1952 and 1962, and January 1, 1970*—Continued

[Million board feet, International ¼-inch log rule]

Section, region, and State	Total, all ownerships			National Forest			Other public			Forest industry			Farm and miscellaneous private		
	1970	1962	1952	1970	1962	1952	1970	1962	1952	1970	1962	1952	1970	1962	1952
Pacific Northwest:															
Alaska: Coastal	1,273	1,279	1,268	1,168	1,174	1,163	98	99	98	0	0	0	6	6	6
Oregon:															
Western	22,975	19,564	15,733	4,898	4,461	3,593	3,577	2,670	2,000	5,612	5,023	4,093	8,888	7,410	6,047
Eastern	89	80	68	38	32	24	16	14	22	0	0	0	35	34	22
Summary	23,064	19,644	15,801	4,936	4,493	3,617	3,593	2,684	2,022	5,612	5,023	4,093	8,923	7,444	6,069
Washington:															
Western	14,898	11,473	7,585	640	579	443	2,545	1,873	1,110	5,106	3,743	2,289	6,607	5,278	3,743
Eastern	423	366	356	80	84	81	216	188	182	44	27	30	83	67	63
Summary	15,321	11,839	7,941	720	663	524	2,761	2,061	1,292	5,150	3,770	2,319	6,690	5,345	3,806
Total	39,658	32,762	25,010	6,824	6,330	5,304	6,452	4,844	3,412	10,762	8,793	6,412	15,619	12,795	9,881
Pacific Southwest:															
California	5,901	5,725	5,575	2,120	2,237	2,274	423	403	474	1,129	896	714	2,229	2,189	2,113
Hawaii	834	722	722	0	0	0	399	326	326	0	0	0	435	395	395
Total	6,735	6,447	6,297	2,120	2,237	2,274	822	729	800	1,129	896	714	2,664	2,584	2,508
Total, Pacific Coast	46,394	39,209	31,307	8,944	8,567	7,578	7,275	5,573	4,212	11,891	9,689	7,126	18,284	15,380	12,390
Northern Rocky Mountain:															
Idaho [2]	679	698	700	216	225	209	164	164	159	97	99	105	201	209	226
Montana [2]	1,092	1,070	1,006	81	84	76	270	262	247	20	21	20	719	701	661
South Dakota (West) [2]	9	7	6	0	0	0	1	1	0	0	0	0	7	5	4
Wyoming [2]	324	320	291	33	46	43	110	104	94	2	2	2	177	167	151
Total	2,105	2,095	2,003	331	355	328	547	532	502	121	124	128	1,105	1,083	1,044
Southern Rocky Mountain:															
Arizona [2]	678	646	572	454	434	376	99	94	87	0	0	0	124	117	108
Colorado [2]	3,442	3,832	3,517	2,206	2,677	2,465	280	261	238	0	0	0	955	892	812
Nevada [2]	24	27	24	24	27	24	0	0	0	0	0	0	0	0	0
New Mexico [2]	1,574	1,505	1,372	464	448	385	95	90	84	52	49	46	962	916	856
Utah [2]	1,476	1,475	1,416	1,052	1,054	1,000	133	132	130	0	0	0	290	288	285
Total	7,196	7,485	6,901	4,202	4,640	4,250	608	578	540	53	50	47	2,332	2,215	2,063
Total, Rocky Mountain	9,301	9,580	8,904	4,533	4,995	4,578	1,155	1,111	1,043	174	174	175	3,438	3,299	3,107
Total, all regions	515,477	474,804	433,072	39,536	37,488	30,288	39,790	33,061	25,879	67,757	59,466	51,759	368,393	344,787	325,145

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[1] Data may not add to totals because of truncating. Zeros indicate no data or negligible amounts.

[2] See footnote 2, table 3.

TABLE 10.—*Net volume of timber on commercial timberland in the United States, by class of timber, softwoods and hardwoods, section, region, and State, January 1, 1970* [1]

[Million cubic feet]

Section, region, and State	Total, all timber			Growing-stock trees								
	All species	Softwoods	Hardwoods	Total			Sawtimber trees			Poletimber trees		
				All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
New England:												
Connecticut	2,294	278	2,015	1,898	228	1,670	766	121	644	1,132	106	1,026
Maine	24,061	16,125	7,936	21,253	14,763	6,490	9,059	6,356	2,702	12,193	8,406	3,787
Massachusetts	3,408	883	2,524	2,716	769	1,946	985	428	556	1,731	340	1,390
New Hampshire	5,942	3,287	2,655	5,147	2,901	2,245	2,481	1,758	722	2,665	1,143	1,522
Rhode Island	350	27	322	266	19	246	61	10	51	204	9	195
Vermont	4,413	1,636	2,777	3,928	1,507	2,420	1,790	787	1,002	2,138	720	1,418
Total	40,471	22,239	18,232	35,210	20,190	15,019	15,144	9,464	5,680	20,065	10,726	9,339
Middle Atlantic:												
Delaware	698	237	461	657	229	428	342	134	207	315	94	220
Maryland	3,277	540	2,737	3,074	531	2,543	1,807	373	1,433	1,266	157	1,109
New Jersey	1,839	396	1,442	1,729	385	1,343	1,051	219	832	678	166	511
New York	15,135	3,822	11,312	12,517	3,291	9,226	6,220	1,875	4,344	6,296	1,415	4,881
Pennsylvania	22,702	1,794	20,908	20,270	1,600	18,670	9,126	900	8,226	11,143	699	10,443
West Virginia	15,290	680	14,609	14,085	657	13,428	8,368	422	7,946	5,717	235	5,482
Total	58,944	7,471	51,472	52,333	6,694	45,639	26,916	3,925	22,991	25,417	2,769	22,648
Lake States:												
Michigan	17,909	4,490	13,419	16,558	4,313	12,245	7,415	2,103	5,312	9,142	2,209	6,933
Minnesota	12,387	3,988	8,399	11,726	3,896	7,830	3,635	1,607	2,028	8,091	2,289	5,802
North Dakota	382	0	382	276	0	276	117	0	117	158	0	158
South Dakota (East)	131	19	111	102	18	83	64	10	54	37	8	29
Wisconsin	12,188	2,747	9,441	11,411	2,662	8,748	4,547	1,349	3,197	6,863	1,313	5,550
Total	43,000	11,245	31,754	40,075	10,891	29,184	15,780	5,071	10,709	24,294	5,820	18,474
Central:												
Illinois	2,395	19	2,375	2,327	19	2,308	1,391	5	1,386	936	14	922
Indiana	4,020	74	3,946	3,606	70	3,536	2,448	34	2,413	1,158	35	1,123
Iowa	2,180	3	2,176	1,807	3	1,803	1,358	2	1,356	449	1	447
Kansas	899	1	897	534	0	533	387	0	387	147	0	146
Kentucky	8,863	642	8,221	8,546	621	7,925	5,295	412	4,883	3,251	209	3,041
Missouri	8,083	405	7,678	6,495	384	6,111	2,746	218	2,528	3,749	166	3,583
Nebraska	651	126	525	506	114	391	390	88	302	115	26	89
Ohio	4,916	133	4,782	4,232	123	4,109	2,678	67	2,611	1,554	56	1,497
Total	32,009	1,405	30,604	28,057	1,338	26,719	16,696	828	15,867	11,361	509	10,852
Total, North	174,425	42,362	132,063	155,677	39,114	116,563	74,537	19,288	55,248	81,139	19,825	61,314
South Atlantic:												
North Carolina	22,222	8,743	13,479	19,680	8,509	11,171	13,156	6,331	6,824	6,524	2,177	4,346
South Carolina	14,958	6,614	8,344	12,699	6,369	6,330	9,198	4,813	4,384	3,501	1,555	1,945
Virginia	18,797	4,548	14,248	15,171	4,215	10,955	9,604	2,847	6,757	5,566	1,368	4,198
Total	55,979	19,906	36,072	47,550	19,093	28,456	31,958	13,992	17,966	15,592	5,101	10,490
East Gulf:												
Florida	12,565	7,099	5,465	10,888	6,904	3,984	6,930	4,407	2,523	3,958	2,497	1,461
Georgia	21,355	12,139	9,216	19,695	11,839	7,855	11,964	7,716	4,248	7,730	4,123	3,606
Total	33,921	19,239	14,681	30,583	18,743	11,839	18,895	12,123	6,771	11,688	6,620	5,067
Central Gulf:												
Alabama	17,890	9,400	8,490	16,009	9,232	6,777	10,845	6,921	3,923	5,164	2,311	2,853
Mississippi	15,969	7,280	8,688	13,878	7,188	6,689	8,821	5,252	3,569	5,056	1,936	3,120
Tennessee	12,139	1,870	10,268	10,395	1,799	8,596	5,904	1,038	4,866	4,491	761	3,729
Total	45,999	18,550	27,448	40,283	18,220	22,062	25,571	13,212	12,359	14,712	5,008	9,703
West Gulf:												
Arkansas	17,848	6,630	11,217	15,365	6,539	8,826	9,764	4,970	4,793	5,601	1,568	4,032
Louisiana	16,279	7,781	8,497	13,602	7,595	6,006	10,424	6,263	4,161	3,177	1,332	1,845
Oklahoma	2,415	861	1,554	1,648	850	798	944	584	359	704	266	438
Texas	12,093	7,412	4,680	10,482	7,361	3,121	7,488	5,823	1,665	2,994	1,538	1,456
Total	48,636	22,686	25,950	41,099	22,346	18,753	28,621	17,641	10,980	12,477	4,705	7,772
Total, South	184,535	80,383	104,152	159,517	78,404	81,112	105,046	56,968	48,078	54,470	21,436	33,034

See footnotes at end of table.

TABLE 10.—*Net volume of timber on commercial timberland in the United States, by class of timber, softwoods and hardwoods, section, region, and State, January 1, 1970*[1]—Continued

[Million cubic feet]

Section, region, and State	Total, all timber			Growing-stock trees								
				Total			Sawtimber trees			Poletimber trees		
	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
Pacific Northwest:												
Alaska: Coastal	35, 972	35, 668	304	34, 767	34, 468	298	32, 527	32, 294	233	2, 239	2, 174	65
Oregon:												
Western	65, 898	59, 133	6, 765	62, 817	56, 823	5, 994	55, 073	51, 455	3, 618	7, 744	5, 368	2, 376
Eastern	24, 905	24, 845	60	24, 276	24, 238	38	18, 441	18, 431	10	5, 835	5, 807	28
Summary	90, 803	83, 978	6, 825	87, 093	81, 061	6, 032	73, 514	69, 886	3, 628	13, 579	11, 175	2, 404
Washington:												
Western	50, 023	44, 693	5, 330	47, 323	42, 336	4, 987	39, 675	36, 925	2, 750	7, 648	5, 411	2, 237
Eastern	18, 363	18, 119	244	17, 792	17, 621	171	12, 963	12, 883	80	4, 829	4, 738	91
Summary	68, 386	62, 812	5, 574	65, 115	59, 957	5, 158	52, 638	49, 808	2, 830	12, 477	10, 149	2, 328
Total	195, 161	182, 458	12, 703	186, 975	175, 486	11, 488	158, 679	151, 988	6, 691	28, 295	23, 498	4, 797
Pacific Southwest:												
California	55, 716	52, 128	3, 588	54, 251	51, 152	3, 099	48, 452	46, 138	2, 314	5, 799	5, 014	785
Hawaii	470	5	464	238	4	234	194	3	190	44	0	44
Total	56, 186	52, 133	4, 052	54, 489	51, 156	3, 333	48, 646	46, 141	2, 504	5, 843	5, 014	829
Total, Pacific Coast	251, 347	234, 591	16, 756	241, 465	226, 643	14, 822	207, 326	198, 130	9, 195	34, 139	28, 512	5, 627
Northern Rocky Mountain:												
Idaho [2]	31, 563	31, 234	329	29, 497	29, 257	239	24, 020	23, 897	122	5, 477	5, 360	117
Montana [2]	33, 181	32, 861	320	28, 650	28, 376	273	19, 677	19, 465	211	8, 972	8, 910	62
South Dakota (West) [2]	1, 060	1, 052	7	1, 007	1, 001	6	695	693	1	311	307	4
Wyoming [2]	5, 412	5, 161	251	4, 673	4, 471	201	3, 173	3, 123	50	1, 499	1, 347	151
Total	71, 218	70, 309	908	63, 827	63, 106	721	47, 566	47, 181	385	16, 261	15, 925	336
Southern Rocky Mountain:												
Arizona [2]	5, 218	4, 861	356	4, 809	4, 583	226	4, 323	4, 190	132	486	393	93
Colorado [2]	14, 942	12, 059	2, 882	12, 267	10, 360	1, 907	8, 083	7, 392	691	4, 183	2, 968	1, 215
Nevada [2]	278	254	24	250	237	12	232	227	5	17	10	7
New Mexico [2]	7, 183	6, 324	858	6, 336	5, 735	600	5, 158	4, 889	269	1, 178	846	331
Utah [2]	5, 397	4, 021	1, 375	4, 727	3, 689	1, 038	3, 100	2, 765	335	1, 627	923	703
Total	33, 019	27, 521	5, 497	28, 391	24, 605	3, 785	20, 898	19, 464	1, 434	7, 492	5, 141	2, 351
Total, Rocky Mountain	104, 237	97, 830	6, 406	92, 218	87, 711	4, 507	68, 464	66, 645	1, 819	23, 753	21, 066	2, 687
Total, all regions	714, 545	455, 168	259, 377	648, 879	431, 873	217, 005	455, 375	341, 033	114, 341	193, 503	90, 840	102, 663

Section, region, and State	Rough trees			Rotten trees			Salvable dead trees		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
New England:									
Connecticut	283	44	239	112	5	106	0	0	0
Maine	1, 389	777	612	1, 418	585	833	0	0	0
Massachusetts	535	108	427	155	4	150	0	0	0
New Hampshire	494	358	135	301	27	274	0	0	0
Rhode Island	63	8	55	20	0	20	0	0	0
Vermont	319	113	205	166	14	151	0	0	0
Total	3, 086	1, 411	1, 674	2, 175	637	1, 537	0	0	0
Middle Atlantic:									
Delaware	24	6	18	17	2	15	0	0	0
Maryland	139	7	132	63	1	62	0	0	0
New Jersey	60	7	53	49	4	45	0	0	0
New York	1, 524	445	1, 078	1, 093	85	1, 008	0	0	0
Pennsylvania	1, 766	173	1, 593	665	20	645	0	0	0
West Virginia	309	18	290	895	4	890	0	0	0
Total	3, 825	658	3, 166	2, 785	118	2, 666	0	0	0
Lake States:									
Michigan	1, 021	121	899	266	34	232	63	21	41
Minnesota	232	28	204	415	55	360	12	9	3
North Dakota	63	0	63	42	0	42	0	0	0
South Dakota (East)	9	0	9	19	0	19	0	0	0
Wisconsin	452	43	409	269	26	242	55	14	41
Total	1, 780	193	1, 586	1, 013	116	897	131	45	86

See footnotes at end of table.

TABLE 10.—*Net volume of timber on commercial timberland in the United States, by class of timber, softwoods and hardwoods, section, region, and State, January 1, 1970* [1]—Continued

[Million cubic feet]

Section, region, and State	Rough trees			Rotten trees			Salvable dead trees		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
Central:									
Illinois	51	0	51	8	0	8	8	0	8
Indiana	319	3	315	71	0	71	22	0	22
Iowa	247	0	247	125	0	125	0	0	0
Kansas	338	0	337	21	0	21	4	0	4
Kentucky	197	17	180	95	1	93	24	1	23
Missouri	687	15	672	849	1	847	50	3	46
Nebraska	107	9	97	31	1	30	5	0	5
Ohio	396	7	388	286	1	285	0	0	0
Total	2,345	55	2,290	1,489	6	1,483	115	5	110
Total, North	11,037	2,318	8,718	7,463	879	6,584	247	60	196
South Atlantic:									
North Carolina	1,509	177	1,331	1,012	47	964	20	9	11
South Carolina	1,750	197	1,553	484	31	452	23	16	7
Virginia	2,994	316	2,678	627	14	613	4	1	2
Total	6,255	692	5,563	2,124	93	2,030	48	27	21
East Gulf:									
Florida	1,353	132	1,221	308	52	256	15	10	4
Georgia	1,160	240	920	487	47	439	12	12	0
Total	2,514	372	2,142	795	100	695	27	23	4
Central Gulf:									
Alabama	1,304	111	1,192	506	20	486	70	35	34
Mississippi	1,491	55	1,435	595	32	562	5	3	1
Tennessee	1,111	37	1,074	605	20	584	26	12	14
Total	3,906	204	3,702	1,706	73	1,633	102	52	49
West Gulf:									
Arkansas	1,602	54	1,547	850	25	825	29	12	17
Louisiana	1,743	84	1,658	920	95	824	13	5	7
Oklahoma	596	7	588	167	3	164	3	0	3
Texas	1,101	39	1,062	506	10	496	2	1	1
Total	5,042	185	4,856	2,445	134	2,310	49	19	30
Total, South	17,718	1,454	16,264	7,071	401	6,670	227	122	105
Pacific Northwest:									
Alaska: Coastal	112	110	2	735	731	3	357	357	0
Oregon:									
Western	949	244	705	197	171	26	1,935	1,895	40
Eastern	281	260	21	68	67	1	280	280	0
Summary	1,230	504	726	265	238	27	2,215	2,175	40
Washington:									
Western	583	295	288	428	409	19	1,689	1,653	36
Eastern	113	46	67	83	77	6	375	375	0
Summary	696	341	355	511	486	25	2,064	2,028	36
Total	2,038	955	1,083	1,511	1,455	55	4,636	4,560	76
Pacific Southwest:									
California	415	56	359	828	698	130	222	222	0
Hawaii	187	1	186	42	0	42	1	0	1
Total	602	57	545	870	698	172	223	222	1
Total, Pacific Coast	2,640	1,012	1,628	2,381	2,153	227	4,860	4,782	77
Northern Rocky Mtn.:									
Idaho [2]	572	521	50	554	525	28	940	929	10
Montana [2]	846	823	23	684	672	12	3,000	2,990	10
South Dakota (West) [2]	2	1	1	3	3	0	47	47	0
Wyoming [2]	86	82	4	75	55	20	577	552	25
Total	1,507	1,428	78	1,318	1,256	62	4,564	4,518	46
Southern Rocky Mtn.:									
Arizona [2]	199	132	67	75	17	58	133	128	4
Colorado [2]	317	246	71	1,016	243	773	1,340	1,210	130
Nevada [2]	6	4	1	11	3	7	10	9	1
New Mexico [2]	351	253	97	148	36	112	346	299	47
Utah [2]	141	60	81	223	31	192	303	240	63
Total	1,016	696	319	1,476	331	1,144	2,134	1,887	247
Total, Rocky Mountain	2,523	2,125	398	2,794	1,587	1,206	6,699	6,405	293
Total All Regions	33,920	6,910	27,010	19,711	5,022	14,688	12,034	11,361	673

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[1] Data may not add to totals because of truncating. Zeros indicate no data or negligible amounts.

[2] See footnote 2, table 3.

TABLE 11.—*Net volume of growing stock on commercial timberland in the United States, by diameter class, softwoods and hardwoods, and timber supply region, as of December 31, 1952 and 1962, and January 1, 1970* [1]

[Million cubic feet]

SOFTWOOD GROWING STOCK

Timber supply region	Year	Total	Diameter class (inches)									
			5.0 to 7.0	7.0 to 9.0	9.0 to 11.0	11.0 to 13.0	13.0 to 15.0	15.0 to 17.0	17.0 to 19.0	19.0 to 21.0	21.0 to 29.0	29.0+
Northeast	1970	26, 884	6, 936	6, 559	4, 720	3, 235	2, 111	1, 361	793	480	611	74
	1962	23, 672	6, 065	5, 696	3, 996	2, 817	1, 913	1, 248	742	484	623	84
	1952	20, 027	4, 627	4, 734	3, 146	2, 497	1, 791	1, 190	720	527	701	90
Northcentral	1970	12, 229	3, 321	3, 008	1, 919	1, 320	873	632	420	300	376	55
	1962	10, 347	2, 993	2, 579	1, 588	1, 085	697	495	325	219	316	46
	1952	7, 749	2, 207	1, 925	1, 196	854	535	329	232	172	259	35
Total, North	1970	39, 114	10, 257	9, 567	6, 640	4, 556	2, 984	1, 994	1, 213	780	988	130
	1962	34, 020	9, 058	8, 276	5, 585	3, 902	2, 611	1, 744	1, 067	703	939	130
	1952	27, 777	6, 835	6, 659	4, 343	3, 352	2, 326	1, 520	953	699	961	126
Southeast	1970	37, 837	4, 905	6, 817	7, 422	6, 621	4, 883	3, 138	1, 869	1, 007	1, 023	149
	1962	33, 692	4, 285	6, 292	6, 815	6, 056	4, 243	2, 646	1, 536	826	864	127
	1952	30, 694	3, 687	5, 805	6, 405	5, 669	3, 766	2, 289	1, 305	720	908	134
Southcentral	1970	40, 567	3, 924	5, 789	6, 677	6, 814	5, 982	4, 498	2, 929	1, 869	1, 903	178
	1962	33, 094	3, 307	4, 845	5, 681	5, 611	4, 695	3, 622	2, 365	1, 422	1, 415	126
	1952	24, 421	2, 531	3, 740	4, 462	4, 254	3, 409	2, 516	1, 622	874	889	119
Total, South	1970	78, 404	8, 829	12, 606	14, 100	13, 435	10, 865	7, 636	4, 799	2, 876	2, 926	327
	1962	66, 786	7, 593	11, 137	12, 496	11, 667	8, 938	6, 268	3, 901	2, 248	2, 280	254
	1952	55, 115	6, 219	9, 545	10, 868	9, 923	7, 176	4, 806	2, 927	1, 595	1, 797	254
PNW Douglas-fir	1970	99, 159	2, 479	3, 645	4, 655	5, 281	5, 722	5, 917	5, 840	5, 567	19, 716	40, 337
	1962	104, 410	2, 205	3, 345	4, 264	5, 049	5, 368	5, 674	5, 659	5, 571	19, 966	47, 309
	1952	109, 904	2, 011	2, 858	3, 718	4, 647	4, 618	5, 416	5, 237	5, 507	20, 438	55, 454
PNW ponderosa pine	1970	41, 859	3, 049	3, 679	3, 817	3, 701	3, 449	3, 229	3, 013	2, 661	8, 392	6, 869
	1962	41, 301	2, 777	3, 286	3, 336	3, 265	3, 092	2, 989	2, 879	2, 577	8, 876	8, 224
	1952	39, 670	2, 253	2, 735	2, 648	2, 723	2, 624	2, 674	2, 607	2, 460	9, 069	9, 877
Alaska—Coastal	1970	34, 468	404	691	1, 078	1, 436	1, 782	2, 026	2, 302	2, 357	9, 325	13, 064
	1962	35, 485	674	674	674	958	2, 909	1, 987	1, 880	1, 951	9, 545	14, 229
	1952	35, 493	674	674	674	958	2, 910	1, 987	1, 881	1, 952	9, 547	14, 233
California and Hawaii	1970	51, 156	1, 088	1, 756	2, 170	2, 375	2, 465	2, 529	2, 535	2, 481	9, 829	23, 924
	1962	53, 953	958	1, 529	1, 920	2, 138	2, 276	2, 369	2, 415	2, 397	9, 998	27, 950
	1952	58, 009	766	1, 245	1, 603	1, 835	2, 055	2, 159	2, 268	2, 281	10, 140	33, 654
Total, Pacific Coast	1970	226, 643	7, 020	9, 771	11, 720	12, 793	13, 419	13, 702	13, 691	13, 066	47, 262	84, 194
	1962	235, 150	6, 614	8, 834	10, 194	11, 410	13, 646	13, 019	12, 834	12, 497	48, 386	97, 712
	1952	243, 077	5, 704	7, 512	8, 643	10, 163	12, 207	12, 237	11, 993	12, 200	49, 195	113, 218
Northern Rocky Mountain [2]	1970	63, 106	7, 084	8, 840	8, 509	7, 400	6, 260	5, 185	4, 245	3, 429	8, 308	3, 840
	1962	65, 091	7, 760	7, 688	7, 863	7, 393	6, 696	5, 828	4, 865	3, 999	9, 437	3, 559
	1952	60, 111	6, 371	6, 489	6, 789	6, 500	6, 007	5, 313	4, 551	3, 808	9, 497	4, 782
Southern Rocky Mountain [2]	1970	24, 605	2, 722	2, 418	2, 484	2, 534	2, 464	2, 441	2, 193	1, 819	4, 300	1, 226
	1962	26, 173	2, 528	2, 252	2, 399	2, 689	2, 691	2, 641	2, 353	2, 018	4, 924	1, 673
	1952	24, 931	2, 108	1, 861	2, 036	2, 356	2, 437	2, 463	2, 260	2, 006	5, 226	2, 174
Total, Rocky Mountain	1970	87, 711	9, 806	11, 259	10, 994	9, 934	8, 725	7, 626	6, 439	5, 249	12, 608	5, 066
	1962	91, 264	10, 288	9, 940	10, 262	10, 082	9, 387	8, 470	7, 219	6, 018	14, 362	5, 232
	1952	85, 043	8, 480	8, 351	8, 826	8, 856	8, 445	7, 776	6, 811	5, 814	14, 723	6, 956
Total, softwoods	1970	431, 873	35, 914	43, 205	43, 455	40, 720	35, 995	30, 959	26, 144	21, 973	63, 786	89, 718
	1962	427, 221	33, 554	38, 188	38, 539	37, 063	34, 583	29, 503	25, 023	21, 467	65, 967	103, 330
	1952	411, 012	27, 239	32, 068	32, 681	32, 296	30, 156	26, 340	22, 686	20, 310	66, 677	120, 555

See footnotes at end of table.

TABLE 11.—*Net volume of growing stock on commercial timberland in the United States, by diameter class, softwoods and hardwoods, and timber supply region, as of December 31, 1952 and 1962, and January 1, 1970*[1]—Continued

HARDWOOD GROWING STOCK

Timber supply region	Year	Total	Diameter class (inches)									
			5.0 to 7.0	7.0 to 9.0	9.0 to 11.0	11.0 to 13.0	13.0 to 15.0	15.0 to 17.0	17.0 to 19.0	19.0 to 21.0	21.0 to 29.0	29.0+
Northeast	1970	60,659	9,937	11,168	10,881	8,696	6,735	4,755	3,205	1,975	2,845	456
	1962	52,973	8,634	9,735	9,392	7,392	5,809	4,173	2,874	1,815	2,729	416
	1952	43,197	6,925	7,703	7,331	5,712	4,651	3,577	2,532	1,659	2,708	394
Northcentral	1970	55,903	9,363	10,521	9,441	7,385	5,955	4,475	3,055	1,917	3,234	553
	1962	48,204	8,020	8,825	8,135	6,321	5,094	3,841	2,658	1,735	3,045	528
	1952	38,979	5,810	6,616	6,717	4,950	4,219	3,226	2,367	1,606	2,975	489
Total, North	1970	116,563	19,300	21,690	20,323	16,082	12,691	9,231	6,260	3,893	6,079	1,009
	1962	101,177	16,654	18,560	17,527	13,714	10,904	8,014	5,532	3,550	5,775	945
	1952	82,177	12,736	14,319	14,048	10,662	8,871	6,804	4,900	3,266	5,684	883
Southeast	1970	40,296	4,114	5,379	6,064	6,178	5,509	4,225	3,115	2,026	2,999	683
	1962	37,547	3,503	4,880	5,837	5,748	5,241	3,952	2,928	1,939	2,917	598
	1952	34,953	2,899	4,308	5,481	5,236	4,937	3,653	2,834	1,909	3,066	626
Southcentral	1970	40,815	4,655	6,135	6,685	6,327	5,477	4,104	2,648	1,779	2,583	418
	1962	40,708	4,413	5,836	6,636	6,277	5,493	4,048	2,818	1,929	2,813	440
	1952	40,616	3,999	5,404	6,420	6,130	5,509	4,261	3,089	2,062	3,206	532
Total, South	1970	81,112	8,769	11,515	12,749	12,505	10,987	8,330	5,764	3,805	5,583	1,102
	1962	78,255	7,916	10,717	12,474	12,026	10,734	8,001	5,746	3,869	5,731	1,038
	1952	75,569	6,898	9,712	11,901	11,366	10,447	7,915	5,924	3,972	6,272	1,158
PNW Douglas-fir	1970	10,981	1,539	1,549	1,525	1,405	1,249	976	758	547	1,105	328
	1962	9,063	1,270	1,296	1,294	1,202	1,059	777	604	434	894	233
	1952	6,908	999	1,026	1,026	938	800	526	449	314	648	182
PNW ponderosa pine	1970	209	50	41	28	28	8	3	10	8	28	5
	1962	192	44	37	26	27	8	3	9	7	26	5
	1952	174	38	36	23	23	7	3	9	7	23	5
Alaska—Coastal	1970	298	12	20	32	34	31	33	32	31	43	26
	1962	300	17	15	15	37	34	36	34	34	46	28
	1952	298	17	15	15	36	33	36	34	33	46	28
California and Hawaii	1970	3,333	202	311	315	327	351	298	281	235	598	412
	1962	3,194	200	314	296	301	327	277	265	217	567	427
	1952	3,047	192	319	249	281	300	257	241	203	536	466
Total, Pacific Coast	1970	14,822	1,803	1,922	1,901	1,794	1,640	1,310	1,081	821	1,774	771
	1962	12,749	1,532	1,663	1,632	1,567	1,428	1,093	913	692	1,533	693
	1952	10,427	1,247	1,397	1,314	1,278	1,141	822	734	557	1,253	681
Northern Rocky Mountain [2]	1970	721	115	118	102	92	73	53	39	31	83	11
	1962	701	105	112	100	91	68	51	40	29	87	15
	1952	634	87	95	87	80	61	46	38	28	86	23
Southern Rocky Mountain [2]	1970	3,785	657	942	751	575	385	223	131	63	54	0
	1962	3,784	444	836	839	649	440	267	155	85	66	0
	1952	3,325	355	705	728	579	404	250	148	84	68	0
Total, Rocky Mountain	1970	4,507	772	1,060	853	668	459	277	171	95	137	11
	1962	4,486	550	948	939	740	508	318	196	115	153	15
	1952	3,960	443	800	815	659	465	296	186	112	155	23
Total, hardwoods	1970	217,005	30,646	36,189	35,828	31,050	25,778	19,149	13,277	8,615	13,575	2,894
	1962	196,669	26,653	31,888	32,573	28,048	23,576	17,427	12,388	8,227	13,194	2,692
	1952	172,134	21,324	26,230	28,080	23,968	20,925	15,838	11,745	7,908	13,366	2,746

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[1] Data may not add to totals because of truncating. Zeros indicate no data or negligible amounts.

[2] See footnote 2, table 3.

TABLE 12.—*Net volume of sawtimber on commercial timberland in the United States, by diameter class, softwoods and hardwoods, and timber supply region, as of December 31, 1952 and 1962, and January 1, 1970* [1]

[Million board feet, International ¼-inch log rule]

SOFTWOOD SAWTIMBER

Timber supply region	Year	Total	Diameter class (inches)							
			9.0 to 11.0	11.0 to 13.0	13.0 to 15.0	15.0 to 17.0	17.0 to 19.0	19.0 to 21.0	21.0 to 29.0	29.0+
Northeast	1970	49,846	15,809	11,799	8,107	5,532	3,356	2,131	2,763	346
	1962	44,757	13,419	10,303	7,399	5,102	3,155	2,160	2,835	383
	1952	40,584	10,676	9,154	6,897	4,856	3,036	2,352	3,204	409
Northcentral	1970	30,215	8,656	6,373	4,636	3,521	2,469	1,742	2,453	362
	1962	24,445	7,178	5,254	3,698	2,758	1,920	1,306	2,023	305
	1952	18,355	5,376	4,127	2,829	1,804	1,343	977	1,686	210
Total, North	1970	80,061	24,465	18,172	12,744	9,053	5,826	3,873	5,217	708
	1962	69,202	20,597	15,557	11,097	7,860	5,075	3,467	4,858	688
	1952	58,939	16,052	13,281	9,726	6,660	4,379	3,329	4,890	619
Southeast	1970	114,712	27,112	28,622	22,997	15,447	9,474	5,068	5,298	691
	1962	101,042	24,844	26,169	19,994	13,012	7,776	4,169	4,486	591
	1952	92,326	23,335	24,488	17,726	11,218	6,583	3,634	4,717	624
Southcentral	1970	161,163	26,976	33,932	32,692	25,981	17,334	11,309	11,828	1,108
	1962	129,355	22,911	27,903	25,607	20,819	13,959	8,592	8,772	789
	1952	93,245	17,997	21,140	18,585	14,443	9,563	5,278	5,498	738
Total, South	1970	275,875	54,088	62,554	55,690	41,429	26,808	16,378	17,127	1,799
	1962	230,397	47,755	54,072	45,601	33,831	21,735	12,761	13,259	1,380
	1952	185,571	41,332	45,628	36,311	25,661	16,146	8,912	10,216	1,362
PNW Douglas-fir	1970	562,341	0	24,156	29,193	32,652	34,052	33,825	127,948	280,515
	1962	607,707	0	22,676	27,391	31,320	32,981	33,822	131,732	327,785
	1952	658,954	0	20,913	23,500	29,816	30,407	33,279	134,996	386,043
PNW ponderosa pine	1970	182,132	0	16,729	17,116	17,178	16,832	15,494	52,235	46,548
	1962	188,019	0	14,800	15,373	15,897	16,088	15,047	51,156	59,658
	1952	191,159	0	12,312	12,970	14,195	14,565	14,310	53,900	68,907
Alaska	1970	178,101	0	5,657	8,227	10,326	12,488	12,875	52,225	76,301
	1962	182,224	0	9,657	10,386	10,751	10,386	18,404	43,369	79,267
	1952	183,928	0	9,748	10,483	10,851	10,483	18,576	43,775	80,009
California and Hawaii	1970	271,671	0	6,409	9,363	11,063	11,706	12,733	57,715	162,679
	1962	296,633	0	5,828	8,660	10,359	11,149	12,328	58,784	189,521
	1952	331,161	0	5,105	7,795	9,423	10,416	11,750	59,674	226,994
Total, Pacific Coast	1970	1,194,245	0	52,951	63,900	71,219	75,079	74,928	290,123	566,044
	1962	1,274,583	0	52,962	61,811	68,327	70,605	79,601	285,041	656,232
	1952	1,365,202	0	48,079	54,749	64,286	65,872	77,916	292,345	761,953
Northern Rocky Mountain [2]	1970	251,387	39,607	36,753	32,550	28,140	23,561	19,485	48,481	22,805
	1962	267,307	37,420	36,692	34,885	31,480	27,075	22,745	55,381	21,629
	1952	256,570	32,297	32,256	31,341	28,737	25,354	21,671	55,704	29,210
Southern Rocky Mountain [2]	1970	103,719	12,521	12,157	12,555	12,794	11,807	9,974	24,541	7,366
	1962	114,037	13,245	12,056	13,141	13,635	12,681	11,228	28,075	9,976
	1952	112,603	11,361	10,602	11,918	12,708	12,161	11,142	29,757	12,954
Total, Rocky Mountain	1970	355,106	52,129	48,911	45,106	40,934	35,369	29,460	73,023	30,172
	1962	381,344	50,665	48,748	48,026	45,115	39,756	33,973	83,456	31,605
	1952	369,173	43,658	42,858	43,259	41,445	37,515	32,813	85,461	42,164
Total, softwoods	1970	1,905,289	130,682	182,589	177,440	162,636	143,083	124,640	385,490	598,725
	1962	1,955,527	119,017	171,341	166,536	155,134	137,172	129,803	386,615	689,906
	1952	1,978,886	101,042	149,847	144,046	138,053	123,913	122,970	392,913	806,099

HARDWOOD SAWTIMBER

Timber supply region	Year	Total	9.0 to 11.0	11.0 to 13.0	13.0 to 15.0	15.0 to 17.0	17.0 to 19.0	19.0 to 21.0	21.0 to 29.0	29.0+
Northeast	1970	110,305	0	29,194	25,236	18,892	13,415	8,605	12,841	2,118
	1962	98,004	0	24,972	21,905	16,686	12,120	7,980	12,400	1,941
	1952	84,022	0	19,480	17,700	14,443	10,744	7,390	12,404	1,861
Northcentral	1970	141,501	0	37,262	31,486	24,184	16,855	10,636	17,773	3,303
	1962	123,480	0	31,899	26,880	20,678	14,613	9,541	16,739	3,127
	1952	103,342	0	24,059	21,559	16,983	12,776	8,808	16,101	3,053
Total, North	1970	251,806	0	66,456	56,723	43,076	30,271	19,242	30,614	5,421
	1962	221,484	0	56,871	48,785	37,364	26,733	17,521	29,139	5,068
	1952	187,364	0	43,539	39,259	31,426	23,520	16,198	28,505	4,914

See footnotes at end of table.

TABLE 12.—*Net volume of sawtimber on commercial timberland in the United States, by diameter class, softwoods and hardwoods, and timber supply region, as of December 31, 1952 and 1962, and January 1, 1970* [1]—Continued

[Million board feet, International ¼-inch log rule]

HARDWOOD SAWTIMBER—Continued

Timber supply region	Year	Total	Diameter class (inches)							
			9.0 to 11.0	11.0 to 13.0	13.0 to 15.0	15.0 to 17.0	17.0 to 19.0	19.0 to 21.0	21.0 to 29.0	29.0+
Southeast	1970	102,303	0	21,417	22,236	18,414	14,024	9,295	13,808	3,106
	1962	96,843	0	19,934	21,172	17,262	13,215	8,932	13,588	2,739
	1952	92,879	0	18,168	19,943	15,957	12,784	8,809	14,335	2,882
Southcentral	1970	105,671	0	24,409	24,211	19,433	13,013	8,974	13,392	2,236
	1962	107,687	0	24,127	24,169	19,074	13,771	9,686	14,518	2,339
	1952	112,617	0	23,531	24,214	20,063	15,078	10,353	16,540	2,834
Total, South	1970	207,974	0	45,827	46,447	37,848	27,037	18,270	27,200	5,343
	1962	204,530	0	44,061	45,341	36,336	26,986	18,618	28,107	5,078
	1952	205,496	0	41,699	44,157	36,020	27,862	19,162	30,876	5,717
PNW Douglas-fir	1970	37,873	0	6,414	6,419	5,574	4,750	3,636	8,222	2,858
	1962	31,037	0	5,490	5,469	4,477	3,823	2,923	6,274	2,581
	1952	23,318	0	4,317	4,171	3,112	2,881	2,141	4,645	2,051
PNW ponderosa pine	1970	512	0	122	41	17	51	46	192	43
	1962	446	0	107	36	16	44	38	163	42
	1952	424	0	101	36	15	43	37	152	40
Alaska	1970	1,273	0	164	171	164	173	156	305	137
	1962	1,279	0	165	172	165	174	157	307	138
	1952	1,268	0	163	171	163	172	156	304	137
California and Hawaii	1970	6,735	0	627	795	766	765	706	1,765	1,310
	1962	6,447	0	575	739	709	719	640	1,677	1,386
	1952	6,297	0	533	679	660	667	606	1,608	1,542
Total, Pacific Coast	1970	46,394	0	7,327	7,427	6,521	5,739	4,544	10,484	4,349
	1962	39,209	0	6,337	6,417	5,367	4,760	3,759	8,421	4,147
	1952	31,307	0	5,114	5,057	3,950	3,763	2,940	6,709	3,770
Northern Rocky Mountain [2]	1970	2,105	0	485	411	295	209	169	458	75
	1962	2,095	0	473	381	283	215	162	478	103
	1952	2,003	0	415	343	255	204	154	475	157
Southern Rocky Mountain [2]	1970	7,196	0	2,787	1,924	1,163	703	335	281	0
	1962	7,485	0	2,882	1,964	1,207	713	403	315	1
	1952	6,901	0	2,563	1,804	1,129	683	399	322	1
Total, Rocky Mountain	1970	9,301	0	3,272	2,336	1,459	912	505	740	76
	1962	9,580	0	3,355	2,345	1,490	928	565	793	104
	1952	8,904	0	2,978	2,147	1,384	887	553	797	158
Total, hardwoods	1970	515,477	0	122,883	112,934	88,905	63,961	42,561	69,040	15,190
	1962	474,804	0	110,624	102,889	80,558	59,407	40,464	66,460	14,399
	1952	433,072	0	93,331	90,621	72,782	56,034	38,854	66,888	14,560

[1] Data may not add to totals because of truncating. Zeros indicate no data or negligible amounts.

[2] See footnote 2, table 3.

TABLE 13.—*Net volume of growing stock on commercial timberland in the East by species, diameter class, and timber supply region, January 1, 1970* [1]

[Million cubic feet]

Timber supply region and diameter class (inches)	Total all species	Softwoods										
		Total softwoods	Longleaf and slash pines	Shortleaf and loblolly pines	Other yellow pines	Eastern white and red pines	Jack pine	Spruce and balsam fir	Eastern hemlock	Cypress	Other eastern softwoods	Ponderosa and Jeffrey pine
Northeast:												
5.0 to 7.0	16,873	6,936	0	62	199	842	0	4,573	854	0	403	0
7.0 to 9.0	17,728	6,559	0	109	268	976	0	3,859	856	0	489	0
9.0 to 11.0	15,602	4,720	0	127	235	837	0	2,431	755	0	333	0
11.0 to 13.0	11,932	3,235	0	102	193	732	0	1,334	643	0	229	0
13.0 to 15.0	8,847	2,111	0	64	97	686	0	671	476	0	114	0
15.0 to 17.0	6,117	1,361	0	48	69	480	0	344	357	0	61	0
17.0 to 19.0	3,998	793	0	23	16	303	0	176	244	0	29	0
19.0 to 21.0	2,456	480	0	10	4	258	0	75	122	0	10	0
21.0 to 29.0	3,457	611	0	14	6	395	0	49	133	0	11	0
29.0+	530	74	0	0	0	64	0	0	7	0	2	0
Total	87,544	26,884	0	562	1,092	5,576	0	13,517	4,451	0	1,684	0

See footnote at end of table.

TABLE 13.—*Net volume of growing stock on commercial timberland in the East by species, diameter class, and timber supply region, January 1, 1970*[1]—Continued

[Million cubic feet]

Timber supply region and diameter class (inches)	Total all species	Softwoods										
		Total softwoods	Longleaf and slash pines	Shortleaf and loblolly pines	Other yellow pines	Eastern white and red pines	Jack pine	Spruce and balsam fir	Eastern hemlock	Cypress	Other eastern softwoods	Ponderosa and Jeffrey pine
Northcentral:												
5.0 to 7.0	12, 685	3, 321	0	96	59	229	548	1, 568	56	0	750	10
7.0 to 9.0	13, 530	3, 008	0	135	82	236	563	1, 195	97	0	678	19
9.0 to 11.0	11, 361	1, 919	0	150	86	236	347	528	133	0	410	25
11.0 to 13.0	8, 706	1, 320	0	111	62	298	191	252	157	1	223	23
13.0 to 15.0	6, 828	873	0	70	41	285	69	109	147	1	131	17
15.0 to 17.0	5, 108	632	0	31	20	244	25	83	135	7	71	13
17.0 to 19.0	3, 475	420	0	13	8	211	4	31	101	2	40	7
19.0 to 21.0	2, 217	300	0	3	2	159	0	22	80	2	22	6
21.0 to 29.0	3, 610	376	0	2	1	188	0	4	134	11	31	3
29.0+	609	55	0	0	0	36	0	0	10	6	1	0
Total	68, 133	12, 229	0	615	363	2, 125	1, 751	3, 795	1, 054	32	2, 362	127
North:												
5.0 to 7.0	29, 558	10, 257	0	159	259	1, 071	548	6, 142	911	0	1, 154	10
7.0 to 9.0	31, 258	9, 567	0	244	350	1, 212	563	5, 054	953	0	1, 168	19
9.0 to 11.0	26, 963	6, 640	0	277	321	1, 074	347	2, 960	888	0	744	25
11.0 to 13.0	20, 639	4, 556	0	214	255	1, 030	191	1, 586	801	1	452	23
13.0 to 15.0	15, 676	2, 984	0	134	139	971	69	781	624	1	245	17
15.0 to 17.0	11, 225	1, 994	0	79	89	725	25	428	492	7	133	13
17.0 to 19.0	7, 474	1, 213	0	36	25	515	4	207	345	2	69	7
19.0 to 21.0	4, 674	780	0	14	6	417	1	98	202	2	32	6
21.0 to 29.0	7, 068	988	0	16	7	583	0	54	267	11	43	3
29.0+	1, 139	130	0	0	0	100	0	0	18	6	4	0
Total, North	155, 677	39, 114	0	1, 177	1, 455	7, 702	1, 751	17, 313	5, 506	32	4, 047	127
Southeast:												
5.0 to 7.0	9, 019	4, 905	1, 382	2, 266	784	37	0	0	12	351	68	0
7.0 to 9.0	12, 196	6, 817	2, 004	3, 149	1, 014	53	0	1	15	529	48	0
9.0 to 11.0	13, 487	7, 422	2, 248	3, 537	944	57	0	1	19	560	53	0
11.0 to 13.0	12, 799	6, 621	1, 831	3, 333	725	77	0	1	27	587	36	0
13.0 to 15.0	10, 393	4, 883	1, 140	2, 699	455	70	0	0	20	473	23	0
15.0 to 17.0	7, 363	3, 138	584	1, 928	255	48	0	0	25	285	9	0
17.0 to 19.0	4, 985	1, 869	245	1, 197	151	37	0	0	22	207	7	0
19.0 to 21.0	3, 033	1, 007	103	671	57	36	0	0	15	118	3	0
21.0 to 29.0	4, 023	1, 023	63	640	38	67	0	0	35	174	3	0
29.0+	832	149	1	47	0	9	0	0	23	68	0	0
Total	78, 134	37, 837	9, 606	19, 472	4, 427	495	0	8	218	3, 355	254	0
Southcentral:												
5.0 to 7.0	8, 579	3, 924	377	3, 203	202	5	0	0	2	45	87	0
7.0 to 9.0	11, 925	5, 789	675	4, 670	241	13	0	0	7	114	67	0
9.0 to 11.0	13, 362	6, 677	827	5, 403	229	20	0	0	7	157	32	0
11.0 to 13.0	13, 141	6, 814	940	5, 410	220	19	0	0	7	194	21	0
13.0 to 15.0	11, 459	5, 982	679	4, 811	161	22	0	0	8	287	10	0
15.0 to 17.0	8, 603	4, 498	420	3, 722	102	19	0	0	9	218	5	0
17.0 to 19.0	5, 578	2, 929	204	2, 438	68	18	0	0	2	193	4	0
19.0 to 21.0	3, 648	1, 869	71	1, 599	41	9	0	0	4	141	1	0
21.0 to 29.0	4, 486	1, 903	52	1, 580	40	19	0	0	4	206	0	0
29.0+	596	178	0	80	5	3	0	0	0	87	0	0
Total	81, 383	40, 567	4, 249	32, 918	1, 314	151	0	0	55	1, 646	231	0
South:												
5.0 to 7.0	17, 598	8, 829	1, 760	5, 470	987	43	0	1	15	396	155	0
7.0 to 9.0	24, 122	12, 606	2, 679	7, 819	1, 255	66	0	1	23	643	115	0
9.0 to 11.0	26, 850	14, 100	3, 076	8, 940	1, 173	77	0	1	26	717	86	0
11.0 to 13.0	25, 941	13, 435	2, 771	8, 744	945	97	0	1	34	781	58	0
13.0 to 15.0	21, 852	10, 865	1, 819	7, 510	617	92	0	1	29	761	34	0
15.0 to 17.0	15, 966	7, 636	1, 005	5, 650	357	67	0	0	34	503	15	0
17.0 to 19.0	10, 563	4, 799	450	3, 635	219	55	0	0	25	400	12	0
19.0 to 21.0	6, 682	2, 876	175	2, 270	98	45	0	1	20	260	4	0
21.0 to 29.0	8, 509	2, 926	116	2, 220	79	86	0	0	39	381	3	0
29.0+	1, 429	327	1	128	6	12	0	0	23	155	0	0
Total, South	159, 517	78, 404	13, 855	52, 391	5, 741	646	0	8	273	5, 002	485	0
Summary of the East:												
5.0 to 7.0	47, 157	19, 087	1, 760	5, 629	1, 247	1, 114	548	6, 142	926	396	1, 309	10
7.0 to 9.0	55, 380	22, 174	2, 679	8, 064	1, 606	1, 279	563	5, 056	977	643	1, 284	19
9.0 to 11.0	53, 813	20, 740	3, 076	9, 218	1, 495	1, 152	347	2, 962	915	717	830	25
11.0 to 13.0	46, 580	17, 992	2, 771	8, 958	1, 201	1, 128	191	1, 588	835	782	510	23
13.0 to 15.0	37, 529	13, 850	1, 819	7, 645	756	1, 063	69	782	653	762	279	17
15.0 to 17.0	27, 192	9, 630	1, 005	5, 730	447	792	25	428	527	511	148	13
17.0 to 19.0	18, 038	6, 013	450	3, 671	244	570	4	207	371	403	81	7
19.0 to 21.0	11, 356	3, 657	175	2, 284	105	463	0	98	223	262	36	6
21.0 to 29.0	15, 578	3, 915	116	2, 236	87	669	0	54	307	392	46	3
29.0+	2, 569	457	1	128	6	113	0	0	42	161	4	0
Total	315, 194	117, 519	13, 855	53, 569	7, 197	8, 348	1, 751	17, 321	5, 779	5, 034	4, 533	127

See footnote at end of table.

TABLE 13.—*Net volume of growing stock on commercial timberland in the East by species, diameter class, and timber supply region, January 1, 1970* [1]—Continued

[Million cubic feet]

Timber supply region and diameter class (inches)	Hardwoods																		
	Total hardwoods	Select white oaks	Select red oaks	Other white oaks	Other red oaks	Hickory	Yellow birch	Hard maple	Soft maple	Beech	Sweetgum	Tupelo and blackgum	Ash	Cottonwood and aspen	Basswood	Yellow-poplar	Black walnut	Black cherry	Other eastern hardwoods
Northeast;																			
5.0 to 7.0	9, 937	597	850	706	366	388	424	1, 213	2, 073	544	50	57	403	434	116	194	24	241	1, 249
7.0 to 9.0	11, 168	700	1, 145	802	497	400	438	1, 254	2, 078	629	46	47	466	565	201	247	27	381	1, 238
9.0 to 11.0	10, 881	687	1, 183	805	554	410	432	1, 178	1, 820	649	71	68	442	439	237	324	29	476	1, 067
11.0 to 13.0	8, 696	601	1, 053	630	584	388	351	907	1, 097	569	61	77	379	243	224	355	26	451	692
13.0 to 15.0	6, 735	504	903	477	539	283	273	712	675	473	40	63	257	116	171	403	29	338	473
15.0 to 17.0	4, 755	327	663	321	460	188	178	498	427	357	45	49	168	43	127	346	19	223	309
17.0 to 19.0	3, 205	223	506	228	319	126	128	377	234	209	28	48	85	22	67	253	18	133	194
19.0 to 21.0	1, 975	172	322	120	206	67	79	256	119	125	21	24	44	5	60	145	8	73	122
21.0 to 29.0	2, 845	262	462	196	356	109	126	373	155	183	12	44	66	2	65	185	11	65	166
29.0+	456	75	82	47	57	14	16	40	20	13	0	1	9	1	0	37	1	4	33
Total	60, 659	4, 151	7, 173	4, 337	3, 942	2, 376	2, 450	6, 812	8, 703	3, 754	378	482	2, 322	1, 874	1, 273	2, 493	197	2, 388	5, 547
Northcentral:																			
5.0 to 7.0	9, 363	589	386	330	623	509	72	816	607	68	23	21	593	2, 435	269	111	63	143	1, 696
7.0 to 9.0	10, 521	808	547	366	835	608	83	743	565	88	44	25	603	2, 800	351	149	79	184	1, 636
9.0 to 11.0	9, 441	902	577	396	884	585	99	667	518	115	52	32	507	2, 029	330	162	92	160	1, 326
11.0 to 13.0	7, 385	857	533	347	763	484	99	577	388	139	50	30	396	1, 051	284	195	88	125	970
13.0 to 15.0	5, 955	782	477	287	708	371	101	530	349	143	44	29	258	570	225	178	92	91	711
15.0 to 17.0	4, 475	554	419	204	569	275	96	424	224	153	40	34	197	272	163	143	69	73	558
17.0 to 19.0	3, 055	370	307	122	426	166	64	301	173	138	26	19	110	149	90	106	30	48	400
19.0 to 21.0	1, 917	217	228	63	260	93	48	177	106	89	15	15	69	107	50	64	20	23	264
21.0 to 29.0	3, 234	346	424	144	388	112	67	248	170	181	23	12	98	308	79	104	13	32	477
29.0+	553	70	59	20	57	12	12	18	53	22	3	1	6	74	10	3	0	14	110
Total	55, 903	5, 499	3, 961	2, 282	5, 518	3, 220	744	4, 507	3, 157	1, 143	325	223	2, 842	9, 797	1, 857	1, 219	549	899	8, 154
North;																			
5.0 to 7.0	19, 300	1, 187	1, 236	1, 037	989	898	497	2, 030	2, 681	612	74	79	996	2, 869	386	305	88	384	2, 945
7.0 to 9.0	21, 690	1, 508	1, 692	1, 168	1, 332	1, 009	521	1, 998	2, 643	718	91	72	1, 069	3, 366	553	396	106	565	2, 875
9.0 to 11.0	20, 323	1, 590	1, 761	1, 201	1, 439	996	531	1, 845	2, 339	765	123	101	949	2, 468	567	486	122	636	2, 394
11.0 to 13.0	16, 082	1, 458	1, 586	978	1, 348	872	450	1, 484	1, 486	708	111	108	776	1, 294	509	551	115	577	1, 663
13.0 to 15.0	12, 691	1, 286	1, 380	765	1, 248	655	374	1, 243	1, 024	617	85	93	515	686	397	582	122	429	1, 184
15.0 to 17.0	9, 231	881	1, 082	525	1, 030	463	274	922	652	511	86	84	366	316	290	490	88	297	868
17.0 to 19.0	6, 260	593	814	351	745	293	192	679	408	347	54	67	195	172	158	359	48	182	594
19.0 to 21.0	3, 893	389	550	183	467	161	127	434	225	215	37	39	114	112	111	209	28	97	387
21.0 to 29.0	6, 079	609	887	340	745	221	194	622	325	365	36	56	164	310	144	289	25	98	643
29.0+	1, 009	145	142	68	115	26	29	58	73	36	3	2	15	75	11	41	1	18	143
Total, north	116, 563	9, 650	11, 135	6, 620	9, 461	5, 597	3, 194	11, 319	11, 860	4, 897	704	705	5, 164	11, 672	3, 131	3, 713	746	3, 288	13, 701

Southeast:																		
5.0 to 7.0	4,114	408	125	325	734	252	7	18	375	24	509	465	128	3	16	294	9	22	394
7.0 to 9.0	5,379	518	163	427	948	321	7	25	436	31	657	728	166	5	27	442	11	20	439
9.0 to 11.0	6,064	616	208	464	975	353	5	20	391	44	760	937	195	8	28	551	19	12	470
11.0 to 13.0	6,178	662	218	431	985	397	2	25	355	51	767	1,045	186	5	28	572	14	7	421
13.0 to 15.0	5,509	570	223	393	865	372	4	21	302	59	689	950	147	7	27	507	12	8	346
15.0 to 17.0	4,225	415	200	311	685	296	6	16	206	55	472	743	119	10	23	385	6	4	267
17.0 to 19.0	3,115	280	168	254	518	194	3	15	179	57	346	491	87	6	16	283	10	2	197
19.0 to 21.0	2,026	191	117	198	360	126	3	8	115	30	204	291	53	4	9	176	6	2	124
21.0 to 29.0	2,999	267	245	382	629	176	5	17	143	74	246	350	60	11	12	207	3	1	165
29.0+	683	79	66	123	156	31	0	4	16	9	39	59	10	9	0	36	1	0	37
Total	40,296	4,010	1,739	3,313	6,858	2,523	45	171	2,522	439	4,692	6,063	1,155	72	189	3,457	95	80	2,865
Southcentral:																		
5.0 to 7.0	4,655	507	155	585	878	504	1	34	123	17	669	248	159	7	9	100	13	21	616
7.0 to 9.0	6,135	614	238	749	1,188	713	1	41	136	38	826	439	213	10	15	152	25	29	700
9.0 to 11.0	6,685	702	269	732	1,335	792	0	41	128	48	861	524	216	23	18	212	24	23	730
11.0 to 13.0	6,327	684	271	659	1,223	702	1	31	98	51	852	554	195	32	14	237	25	20	672
13.0 to 15.0	5,477	614	274	527	1,099	547	1	33	70	58	726	458	174	39	17	234	15	10	573
15.0 to 17.0	4,104	422	225	374	858	405	0	21	60	70	477	325	141	50	12	176	10	7	463
17.0 to 19.0	2,648	251	153	249	568	261	0	12	33	45	291	198	105	31	12	96	4	3	331
19.0 to 21.0	1,779	132	122	177	346	190	0	11	13	44	190	132	81	37	4	75	1	1	215
21.0 to 29.0	2,583	175	197	278	535	299	2	12	21	74	210	151	122	92	10	93	0	1	305
29.0+	418	26	37	41	133	45	0	1	1	8	24	15	6	26	0	15	0	0	35
Total	40,815	4,131	1,946	4,375	8,166	4,461	8	240	688	456	5,130	3,049	1,417	352	114	1,394	120	117	4,643
South:																		
5.0 to 7.0	8,769	916	281	910	1,612	756	8	52	498	42	1,178	714	288	11	25	394	23	43	1,010
7.0 to 9.0	11,515	1,132	402	1,177	2,136	1,035	9	66	573	69	1,483	1,168	380	15	42	595	37	49	1,139
9.0 to 11.0	12,749	1,318	478	1,197	2,310	1,146	5	61	519	93	1,621	1,461	412	32	46	763	43	36	1,201
11.0 to 13.0	12,505	1,346	490	1,091	2,208	1,100	4	56	453	102	1,620	1,599	381	37	42	809	39	27	1,093
13.0 to 15.0	10,987	1,184	498	920	1,964	920	5	55	372	117	1,415	1,409	321	47	45	742	28	18	919
15.0 to 17.0	8,330	838	425	686	1,543	701	6	38	267	126	949	1,069	260	60	35	561	17	11	731
17.0 to 19.0	5,764	531	322	504	1,086	456	3	27	212	103	638	690	193	37	28	379	14	5	528
19.0 to 21.0	3,805	324	240	375	706	317	3	19	129	75	394	424	134	41	13	252	7	3	340
21.0 to 29.0	5,583	442	443	660	1,164	475	7	29	164	148	456	501	182	103	23	301	3	2	471
29.0+	1,102	105	104	165	290	76	1	5	18	17	63	74	17	36	0	52	1	0	72
Total, South	81,112	8,141	3,685	7,688	15,025	6,985	54	412	3,210	896	9,822	9,113	2,572	424	304	4,852	216	198	7,509
Summary of the East:																		
5.0 to 7.0	28,070	2,103	1,518	1,947	2,602	1,654	506	2,083	3,180	654	1,253	793	1,284	2,881	411	699	111	428	3,956
7.0 to 9.0	33,205	2,641	2,094	2,345	3,469	2,044	531	2,065	3,217	788	1,574	1,240	1,450	3,382	596	992	143	615	4,015
9.0 to 11.0	33,072	2,908	2,239	2,399	3,749	2,142	537	1,906	2,859	858	1,745	1,563	1,362	2,500	614	1,250	165	672	3,596
11.0 to 13.0	28,588	2,805	2,076	2,069	3,556	1,973	455	1,541	1,940	810	1,732	1,708	1,157	1,332	552	1,360	155	604	2,757
13.0 to 15.0	23,679	2,470	1,878	1,685	3,213	1,575	379	1,298	1,397	734	1,501	1,502	837	734	442	1,324	150	447	2,104
15.0 to 17.0	17,561	1,720	1,507	1,211	2,573	1,164	280	960	919	637	1,035	1,153	626	377	325	1,052	106	309	1,599
17.0 to 19.0	12,025	1,125	1,137	856	1,832	749	195	706	620	450	693	757	389	209	187	739	63	188	1,123
19.0 to 21.0	7,698	714	791	559	1,173	478	130	453	355	290	431	464	249	154	125	462	35	101	727
21.0 to 29.0	11,662	1,051	1,330	1,001	1,909	697	201	651	489	514	492	558	346	413	167	590	28	100	1,115
29.0+	2,111	251	246	233	405	102	30	64	91	54	67	76	32	111	11	94	2	18	216
Total	197,675	17,792	14,820	14,309	24,487	12,582	3,248	11,731	15,070	5,793	10,527	9,818	7,736	12,097	3,435	8,565	962	3,486	21,211

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[1] Data may not add to totals because of truncating. Zeros indicate no data or negligible amounts.

TABLE 14.—*Net volume of growing stock on commercial timberland in the West, by species, diameter class, and timber supply region, January 1, 1970* [1]

[Million cubic feet]

Timber supply region and diameter class (inches)	Total all species	Softwoods															Hardwoods				
		Total softwoods	Douglas-fir	Ponderosa and Jeffrey pine	True firs	Western hemlock	Sugar pine	Western white pine	Redwood	Sitka spruce	Engelmann and other spruce	Western larch	Western redcedar	Incense-cedar	Lodgepole pine	Other western softwoods	Total western hardwoods	Cottonwood and aspen	Red alder	Oak	Other western hardwoods
PNW Douglas-fir:																					
5.0 to 7.0	4,018	2,479	1,099	13	320	717	6	16	0	65	5	0	152	13	51	22	1,539	4	1,061	94	380
7.0 to 9.0	5,194	3,645	1,658	21	428	1,116	5	22	0	79	6	1	202	14	68	25	1,549	10	1,118	108	313
9.0 to 11.0	6,180	4,655	2,136	26	553	1,505	14	31	2	55	6	1	201	24	85	16	1,525	8	1,102	75	340
11.0 to 13.0	6,686	5,281	2,518	36	605	1,609	9	44	2	90	7	1	247	18	72	23	1,405	19	1,020	56	310
13.0 to 15.0	6,971	5,722	2,832	28	674	1,721	18	57	1	63	10	3	214	24	61	16	1,249	17	936	23	273
15.0 to 17.0	6,893	5,917	2,891	39	732	1,752	20	43	2	108	12	1	219	34	40	24	976	36	718	22	200
17.0 to 19.0	6,598	5,840	2,905	44	723	1,684	20	56	2	82	13	5	237	30	22	17	758	31	523	20	184
19.0 to 21.0	6,114	5,567	2,782	40	698	1,586	23	50	1	81	10	3	221	32	16	24	547	21	356	14	156
21.0 to 29.0	20,821	19,716	9,865	162	2,528	5,534	135	178	11	242	31	15	802	112	9	92	1,105	63	601	38	403
29.0+	40,665	40,337	24,686	384	3,521	7,351	526	193	60	813	12	7	2,339	299	0	146	328	34	91	11	192
Total	110,140	99,159	53,372	793	10,782	24,575	776	690	81	1,678	112	37	4,834	600	424	405	10,981	243	7,526	461	2,751
PNW ponderosa pine:																					
5.0 to 7.0	3,099	3,049	541	442	528	30	1	13	0	0	133	162	23	6	1,037	133	50	24	8	0	18
7.0 to 9.0	3,720	3,679	706	538	615	40	2	23	0	0	105	254	32	4	1,212	148	41	17	1	0	23
9.0 to 11.0	3,845	3,817	800	617	650	52	2	38	0	0	126	265	28	5	1,100	134	28	16	1	0	11
11.0 to 13.0	3,729	3,701	820	680	712	50	10	60	0	0	138	286	26	3	805	111	28	19	1	0	8
13.0 to 15.0	3,457	3,449	779	745	712	70	5	50	0	0	135	304	28	2	532	87	8	7	0	0	1
15.0 to 17.0	3,232	3,229	747	844	698	72	7	55	0	0	140	246	27	5	316	72	3	2	0	0	1
17.0 to 19.0	3,023	3,013	686	955	651	70	5	39	0	0	131	213	23	5	179	56	10	9	0	0	1
19.0 to 21.0	2,669	2,661	644	781	630	62	8	38	0	0	113	190	17	8	118	52	8	7	0	0	1
21.0 to 29.0	8,420	8,392	1,873	3,701	1,444	212	16	86	0	0	242	563	49	37	58	111	28	25	0	0	3
29.0+	6,874	6,869	1,641	3,520	983	120	14	57	0	0	104	279	52	32	3	64	5	3	0	0	2
Total	42,068	41,859	9,237	12,823	7,623	778	70	459	0	0	1,367	2,762	305	107	5,360	968	209	129	11	0	69
Alaska—Coastal:																					
5.0 to 7.0	416	404	0	0	0	263	0	0	0	101	0	0	11	0	0	27	12	10	1	0	0
7.0 to 9.0	712	691	0	0	0	450	0	0	0	174	0	0	19	0	0	46	20	17	2	0	0
9.0 to 11.0	1,110	1,078	0	0	0	700	0	0	0	273	0	0	28	0	0	74	32	27	4	0	0
11.0 to 13.0	1,470	1,436	0	0	1	896	0	0	0	388	0	0	47	0	0	101	34	29	4	0	0
13.0 to 15.0	1,814	1,782	0	0	2	1,149	0	0	0	455	0	0	55	0	0	119	31	26	3	0	0
15.0 to 17.0	2,060	2,026	0	0	3	1,329	0	0	0	490	0	0	56	0	0	147	33	28	4	0	0
17.0 to 19.0	2,334	2,302	0	0	3	1,571	0	0	0	538	0	0	71	0	0	116	32	27	3	0	0
19.0 to 21.0	2,388	2,357	0	0	4	1,544	0	0	0	591	0	0	69	0	0	146	31	26	3	0	0
21.0 to 29.0	9,368	9,325	0	0	19	6,189	0	0	0	2,514	0	0	305	0	0	296	43	37	5	0	1
29.0+	13,090	13,064	0	0	29	6,885	0	0	0	5,619	0	0	338	0	0	190	26	22	3	0	0
Total	34,767	34,468	0	0	64	20,980	0	0	0	11,148	3	0	1,005	0	0	1,267	298	255	36	0	7
California and Hawaii:																					
5.0 to 7.0	1,290	1,088	296	232	358	2	66	13	32	0	0	0	1	54	26	8	202	0	1	99	102
7.0 to 9.0	2,067	1,756	474	371	586	2	101	16	64	0	0	0	0	84	45	13	311	7	7	129	168
9.0 to 11.0	2,486	2,170	551	459	733	5	122	19	107	5	0	0	0	93	56	20	315	9	5	115	186
11.0 to 13.0	2,702	2,375	591	503	796	2	135	21	137	0	0	0	0	102	61	27	327	1	5	119	202
13.0 to 15.0	2,817	2,465	626	511	796	10	141	18	175	0	0	0	1	102	60	25	351	11	7	122	211
15.0 to 17.0	2,827	2,529	660	507	812	2	146	20	201	3	0	0	0	94	59	25	298	8	8	86	196
17.0 to 19.0	2,816	2,535	680	503	786	6	150	19	212	3	0	0	0	99	54	23	281	0	5	94	182
19.0 to 21.0	2,717	2,481	671	480	767	2	150	17	221	7	1	0	1	92	51	21	235	0	6	67	162
21.0 to 29.0	10,428	9,829	2,538	1,953	3,091	29	632	64	846	17	2	0	2	368	202	85	598	1	11	206	380
29.0+	24,336	23,924	7,931	4,264	6,019	20	1,854	145	2,352	7	2	0	5	795	385	145	412	3	10	108	291
Total	54,489	51,156	15,018	9,783	14,744	80	3,497	352	4,347	42	5	0	10	1,883	999	396	3,333	40	65	1,145	2,083

Pacific Coast:																				
5.0 to 7.0	8, 823	7, 020	1, 936	687	1, 206	1, 012	73	42	32	166	138	162	187	73	1, 114	190	1, 803	38	1, 071	193	500
7.0 to 9.0	11, 694	9, 771	2, 838	930	1, 629	1, 608	108	61	64	253	111	255	253	102	1, 325	232	1, 922	51	1, 128	237	505
9.0 to 11.0	13, 622	11, 720	3, 487	1, 102	1, 936	2, 262	138	88	109	333	132	266	257	122	1, 241	245	1, 901	60	1, 112	190	538
11.0 to 13.0	14, 588	12, 793	3, 929	1, 219	2, 114	2, 557	154	125	139	478	145	287	320	123	938	263	1, 794	68	1, 030	175	521
13.0 to 15.0	15, 059	13, 419	4, 237	1, 284	2, 184	2, 950	164	125	176	518	145	307	298	128	653	248	1, 640	61	946	145	486
15.0 to 17.0	15, 013	13, 702	4, 298	1, 390	2, 245	3, 155	173	118	203	601	152	247	302	133	415	268	1, 310	74	730	108	397
17.0 to 19.0	14, 772	13, 691	4, 271	1, 502	2, 163	3, 331	175	114	214	623	144	218	331	134	255	212	1, 081	67	531	114	367
19.0 to 21.0	13, 888	13, 066	4, 097	1, 301	2, 099	3, 194	181	105	222	679	124	193	308	132	185	244	821	54	365	81	320
21.0 to 29.0	49, 037	47, 262	14, 276	5, 816	7, 082	11, 964	783	328	857	2, 773	275	578	1, 158	517	269	585	1, 774	126	617	244	787
29.0+	84, 966	84, 194	34, 258	8, 168	10, 552	14, 376	2, 394	395	2, 412	6, 439	118	286	2, 734	1, 126	388	545	771	62	104	119	486
Total	241, 465	226, 643	77, 627	23, 399	33, 213	46, 413	4, 343	1, 501	4, 428	12, 868	1, 487	2, 799	6, 154	2, 590	6, 783	3, 036	14, 822	667	7, 638	1, 606	4, 911
Northern Rocky Mountain:																				
5.0 to 7.0	7, 200	7, 084	1, 138	358	886	61	0	83	0	0	235	299	104	0	3, 807	108	115	74	0	0	41
7.0 to 9.0	8, 959	8, 840	1, 584	554	1, 128	104	0	158	0	0	452	408	122	0	4, 172	154	118	90	0	0	27
9.0 to 11.0	8, 611	8, 509	1, 793	673	1, 141	133	0	190	0	0	481	405	158	0	3, 372	159	102	81	0	0	20
11.0 to 13.0	7, 493	7, 400	1, 826	797	1, 003	139	0	257	0	0	581	403	167	0	2, 090	132	92	81	0	0	11
13.0 to 15.0	6, 334	6, 260	1, 830	759	950	116	0	216	0	0	580	382	186	0	1, 146	92	73	64	0	0	9
15.0 to 17.0	5, 238	5, 185	1, 624	656	771	103	0	247	0	0	616	373	184	0	542	65	53	48	0	0	4
17.0 to 19.0	4, 285	4, 245	1, 393	537	623	98	0	223	0	0	551	339	176	0	259	42	39	37	0	0	2
19.0 to 21.0	3, 460	3, 429	1, 183	418	496	75	0	229	0	0	432	284	164	0	118	27	31	27	0	0	3
21.0 to 29.0	8, 392	8, 308	2, 660	1, 135	1, 264	211	0	611	0	0	1, 086	751	448	0	88	50	83	75	0	0	7
29.0+	3, 851	3, 840	1, 089	953	433	76	0	262	0	0	466	306	238	0	1	12	11	9	0	0	1
Total	63, 827	63, 106	16, 124	6, 845	8, 699	1, 121	0	2, 479	0	0	5, 484	3, 954	1, 951	0	15, 598	846	721	592	0	0	129
Southern Rocky Mountain:[2]																				
5.0 to 7.0	3, 379	2, 722	377	349	545	0	0	0	0	0	510	0	0	0	869	70	657	656	0	0	0
7.0 to 9.0	3, 361	2, 418	286	425	469	0	0	0	0	0	554	0	0	0	631	51	942	942	0	0	0
9.0 to 11.0	3, 236	2, 484	263	476	458	0	0	0	0	0	709	0	0	0	529	46	751	751	0	0	0
11.0 to 13.0	3, 109	2, 534	275	600	404	0	0	0	0	0	765	0	0	0	427	59	575	575	0	0	0
13.0 to 15.0	2, 850	2, 464	306	679	341	0	0	0	0	0	749	0	0	0	338	48	385	385	0	0	0
15.0 to 17.0	2, 665	2, 441	310	859	286	0	0	0	0	0	746	0	0	0	193	44	223	223	0	0	0
17.0 to 19.0	2, 325	2, 193	278	881	252	0	0	0	0	0	678	0	0	0	79	23	131	131	0	0	0
19.0 to 21.0	1, 883	1, 819	244	823	169	0	0	0	0	0	510	0	0	0	48	21	63	63	0	0	0
21.0 to 29.0	4, 354	4, 300	524	2, 327	325	2	0	3	0	0	1, 049	0	0	0	27	39	54	53	0	0	0
29.0+	1, 226	1, 226	241	623	160	1	0	6	0	0	182	0	0	0	1	8	0	0	0	0	0
Total	28, 391	24, 605	3, 109	8, 047	3, 413	4	1	12	0	0	6, 456	0	0	1	3, 148	412	3, 785	3, 782	0	0	2
Rocky Mountain:																				
5.0 to 7.0	10, 579	9, 806	1, 515	707	1, 431	61	0	84	0	0	745	299	104	0	4, 676	178	772	731	0	0	41
7.0 to 9.0	12, 320	11, 259	1, 870	979	1, 598	105	0	158	0	0	1, 007	408	122	0	4, 803	205	1, 060	1, 032	0	0	28
9.0 to 11.0	11, 848	10, 994	2, 057	1, 149	1, 599	133	0	190	0	0	1, 190	405	158	0	3, 902	206	853	832	0	0	21
11.0 to 13.0	10, 602	9, 934	2, 102	1, 397	1, 408	139	0	257	0	0	1, 347	403	167	0	2, 518	191	668	656	0	0	12
13.0 to 15.0	9, 184	8, 725	2, 137	1, 439	1, 291	116	0	216	0	0	1, 329	382	186	0	1, 484	140	459	450	0	0	9
15.0 to 17.0	7, 903	7, 626	1, 935	1, 516	1, 057	104	0	248	0	0	1, 362	373	184	0	735	109	227	272	0	0	4
17.0 to 19.0	6, 610	6, 439	1, 671	1, 418	876	99	0	223	0	0	1, 230	339	176	0	338	65	171	169	0	0	2
19.0 to 21.0	5, 344	5, 249	1, 427	1, 242	665	75	0	230	0	0	943	284	164	0	166	49	95	91	0	0	3
21.0 to 29.0	12, 746	12, 608	3, 184	3, 463	1, 589	213	0	614	0	0	2, 136	751	448	0	116	90	137	129	0	0	7
29.0+	5, 078	5, 066	1, 330	1, 577	593	78	0	268	0	0	648	306	238	0	3	20	11	10	0	0	1
Total	92, 218	87, 711	19, 233	14, 892	12, 112	1, 126	1	2, 491	0	0	11, 940	3, 954	1, 951	1	18, 746	1, 258	4, 507	4, 375	0	0	131
Summary of the West:																				
5.0 to 7.0	19, 403	16, 827	3, 451	1, 394	2, 637	1, 074	73	126	32	166	883	461	292	73	5, 790	369	2, 576	769	1, 071	193	542
7.0 to 9.0	24, 014	21, 031	4, 708	1, 909	3, 227	1, 713	108	219	64	253	1, 118	663	376	102	6, 128	438	2, 983	1, 084	1, 128	237	533
9.0 to 11.0	25, 470	22, 714	5, 544	2, 251	3, 536	2, 396	138	278	109	333	1, 322	671	416	122	5, 143	451	2, 755	893	1, 112	190	560
11.0 to 13.0	25, 191	22, 728	6, 031	2, 616	3, 522	2, 697	154	382	139	478	1, 492	690	488	123	3, 456	455	2, 462	724	1, 030	175	533
13.0 to 15.0	24, 244	22, 145	6, 374	2, 723	3, 476	3, 067	164	341	176	518	1, 474	689	484	128	2, 137	388	2, 099	512	946	145	495
15.0 to 17.0	22, 916	21, 328	6, 233	2, 906	3, 302	3, 259	173	366	203	601	1, 514	620	487	133	1, 150	378	1, 587	347	730	108	402
17.0 to 19.0	21, 383	20, 130	5, 942	2, 920	3, 040	3, 430	175	337	214	623	1, 374	557	508	134	593	278	1, 252	236	531	114	370
19.0 to 21.0	19, 232	18, 315	5, 524	2, 543	2, 765	3, 269	181	335	222	679	1, 068	447	472	132	351	293	916	146	365	81	323
21.0 to 29.0	61, 784	59, 871	17, 460	9, 279	8, 672	12, 177	783	942	857	2, 773	2, 411	1, 329	1, 606	517	385	675	1, 912	255	617	244	795
29.0+	90, 044	89, 261	35, 588	9, 745	11, 146	14, 454	2, 394	663	2, 412	6, 439	766	592	2, 972	1, 126	391	566	783	72	104	119	487
Total	333, 684	314, 354	96, 860	38, 291	45, 326	47, 540	4, 344	3, 992	4, 428	12, 868	13, 428	6, 753	8, 105	2, 591	25, 529	4, 294	19, 329	5, 042	7, 638	1, 606	5, 043

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[1] Data may not add to totals because of truncating. Zeros indicate no data or negligible amounts.

[2] See footnote 2, table 3.

TABLE 15.—*Net volume of sawtimber on commercial timberland in the East by species, diameter class, and timber supply region, January 1, 1970* [1]

[Million board feet, International ¼-inch log rule]

Timber supply region and diameter class (inches)	Total all species	Softwoods										
		Total soft-woods	Longleaf and slash pines	Shortleaf and loblolly pines	Other yellow pines	Eastern white and red pines	Jack pine	Spruce and balsam fir	Eastern hemlock	Cypress	Other eastern soft-woods	Ponder-osa and Jeffrey pine
Northeast:												
9.0 to 11.0	15,809	15,809	0	399	802	2,788	0	8,349	2,391	0	1,079	0
11.0 to 13.0	40,994	11,799	0	340	678	2,675	0	5,011	2,272	0	820	0
13.0 to 15.0	33,344	8,107	0	233	383	2,669	0	2,610	1,773	0	436	0
15.0 to 17.0	24,424	5,532	0	184	276	1,985	0	1,424	1,428	0	232	0
17.0 to 19.0	16,772	3,356	0	97	73	1,330	0	727	1,010	0	117	0
19.0 to 21.0	10,737	2,131	0	46	16	1,164	0	328	530	0	45	0
21.0 to 29.0	15,604	2,763	0	61	36	1,801	0	219	590	0	54	0
29.0+	2,464	346	0	0	0	296	0	0	37	0	12	0
Total	160,151	49,846	0	1,362	2,267	14,711	0	18,670	10,035	0	2,799	0
Northcentral:												
9.0 to 11.0	8,656	8,656	0	593	419	1,293	1,451	2,367	675	1	1,748	106
11.0 to 13.0	43,635	6,373	0	525	327	1,618	876	1,121	820	8	953	122
13.0 to 15.0	36,123	4,636	0	405	229	1,676	343	515	787	9	570	99
15.0 to 17.0	27,705	3,521	0	180	112	1,442	153	408	762	38	337	84
17.0 to 19.0	19,325	2,469	0	64	48	1,273	19	193	587	15	214	52
19.0 to 21.0	12,378	1,742	0	17	12	904	3	139	482	16	119	45
21.0 to 29.0	20,226	2,453	0	12	5	1,225	0	25	870	83	201	28
29.0+	3,665	362	0	2	0	229	0	0	74	42	13	0
Total	171,716	30,215	0	1,800	1,155	9,662	2,847	4,772	5,061	216	4,159	539
North:												
9.0 to 11.0	24,465	24,465	0	992	1,221	4,081	1,451	10,716	3,067	1	2,827	106
11.0 to 13.0	84,629	18,172	0	865	1,005	4,293	876	6,133	3,092	8	1,774	122
13.0 to 15.0	69,467	12,744	0	638	613	4,345	343	3,125	2,561	9	1,007	99
15.0 to 17.0	52,130	9,053	0	365	388	3,428	153	1,833	2,191	38	570	84
17.0 to 19.0	36,097	5,826	0	161	122	2,603	19	920	1,598	15	331	52
19.0 to 21.0	23,115	3,873	0	64	28	2,069	3	467	1,012	16	165	45
21.0 to 29.0	35,831	5,217	0	73	42	3,026	0	245	1,461	83	256	28
29.0+	6,129	708	0	2	0	525	0	0	112	42	26	0
Total	331,868	80,061	0	3,163	3,422	24,374	2,847	23,442	15,096	216	6,959	539
Southeast:												
9.0 to 11.0	27,112	27,112	8,972	12,401	3,297	214	0	10	67	1,934	214	0
11.0 to 13.0	50,040	28,622	8,302	14,303	2,949	336	0	11	115	2,444	157	0
13.0 to 15.0	45,234	22,997	5,555	12,687	2,023	327	0	7	97	2,197	102	0
15.0 to 17.0	33,861	15,447	2,875	9,557	1,190	236	0	2	122	1,415	47	0
17.0 to 19.0	23,498	9,474	1,256	6,116	712	187	0	3	113	1,048	35	0
19.0 to 21.0	14,364	5,068	512	3,400	271	179	0	6	79	607	12	0
21.0 to 29.0	19,107	5,298	340	3,322	191	350	0	2	172	902	17	0
29.0+	3,797	691	5	233	1	43	0	0	100	305	0	0
Total	217,015	114,712	27,821	62,022	10,638	1,877	0	44	868	10,854	586	0
Southcentral:												
9.0 to 11.0	26,976	26,976	3,545	21,758	882	71	0	0	27	594	96	0
11.0 to 13.0	58,341	33,932	4,765	27,019	1,050	89	0	0	30	890	87	0
13.0 to 15.0	56,903	32,692	3,734	26,383	854	106	0	0	43	1,519	50	0
15.0 to 17.0	45,415	25,981	2,420	21,569	569	98	0	0	44	1,252	27	0
17.0 to 19.0	30,348	17,334	1,201	14,492	371	89	0	0	14	1,137	28	0
19.0 to 21.0	20,283	11,309	436	9,711	237	50	0	0	25	841	6	0
21.0 to 29.0	25,220	11,828	325	9,873	241	98	0	0	22	1,269	0	0
29.0+	3,344	1,108	0	508	39	19	0	0	4	536	0	0
Total	266,834	161,163	16,428	131,316	4,246	622	0	0	211	8,040	297	0
South:												
9.0 to 11.0	54,088	54,088	12,517	34,160	4,180	286	0	10	94	2,529	310	0
11.0 to 13.0	108,381	62,554	13,067	41,322	4,000	426	0	11	146	3,334	244	0
13.0 to 15.0	102,137	55,690	9,290	39,070	2,877	434	0	7	140	3,716	153	0
15.0 to 17.0	79,277	41,429	5,296	31,126	1,759	334	0	2	166	2,667	75	0
17.0 to 19.0	53,846	26,808	2,457	20,609	1,083	277	0	3	128	2,185	64	0
19.0 to 21.0	34,648	16,378	948	13,112	508	229	0	6	104	1,448	19	0
21.0 to 29.0	44,327	17,127	665	13,195	432	449	0	2	194	2,171	17	0
29.0+	7,142	1,799	5	742	41	62	0	0	105	842	0	0
Total	483,850	275,875	44,249	193,338	14,884	2,499	0	44	1,080	18,895	883	0
Summary of the East:												
9.0 to 11.0	78,553	78,553	12,517	35,152	5,401	4,367	1,451	10,726	3,162	2,530	3,138	106
11.0 to 13.0	193,011	80,727	13,067	42,188	5,006	4,719	876	6,144	3,238	3,343	2,019	122
13.0 to 15.0	171,605	68,434	9,290	39,709	3,491	4,779	343	3,132	2,701	3,725	1,160	99
15.0 to 17.0	131,407	50,482	5,296	31,491	2,148	3,763	153	1,836	2,357	2,705	645	84
17.0 to 19.0	89,944	32,635	2,457	20,771	1,206	2,880	19	923	1,726	2,201	395	52
19.0 to 21.0	57,763	20,251	948	13,176	537	2,298	3	474	1,117	1,465	184	45
21.0 to 29.0	80,159	22,344	665	13,268	474	3,475	0	247	1,655	2,254	273	28
29.0+	13,272	2,507	5	744	41	588	0	0	217	884	26	0
Total	815,718	355,937	44,249	196,502	18,307	26,873	2,847	23,486	16,177	19,111	7,842	539

See footnote at end of table.

TABLE 15.—*Net volume of sawtimber on commercial timberland in the East by species, diameter class, and timber supply region, January 1, 1970* [1]—Continued

[Million board feet, International ¼-inch log rule]

Timber supply region and diameter class (inches)	Hardwoods																		
	Total hardwoods	Select white oaks	Select red oaks	Other white oaks	Other red oaks	Hickory	Yellow birch	Hard maple	Soft maple	Beech	Sweetgum	Tupelo and blackgum	Ash	Cottonwood and aspen	Basswood	Yellow-poplar	Black walnut	Black cherry	Other eastern hardwoods
Northeast:																			
9.0 to 11.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11.0 to 13.0	29,194	2,015	3,428	1,961	1,951	1,302	1,226	3,111	3,656	1,990	222	260	1,269	880	773	1,218	85	1,445	2,394
13.0 to 15.0	25,236	1,916	3,351	1,636	1,952	1,086	1,129	2,771	2,530	1,847	156	233	932	454	654	1,537	101	1,176	1,767
15.0 to 17.0	18,892	1,260	2,571	1,196	1,834	780	759	2,046	1,644	1,489	179	193	660	181	506	1,418	82	824	1,262
17.0 to 19.0	13,415	920	2,012	908	1,363	550	575	1,674	957	931	121	195	345	99	294	1,082	64	490	825
19.0 to 21.0	8,605	713	1,357	526	894	304	382	1,147	500	608	99	116	185	26	283	613	34	265	544
21.0 to 29.0	12,841	1,127	2,002	889	1,601	488	635	1,790	681	827	61	206	285	11	303	831	52	288	756
29.0+	2,118	365	366	238	266	67	79	201	93	68	0	4	41	5	4	145	7	12	149
Total	110,305	8,321	15,090	7,357	9,864	4,581	4,788	12,743	10,065	7,762	841	1,210	3,720	1,658	2,821	6,848	428	4,503	7,699
Northcentral:																			
9.0 to 11.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11.0 to 13.0	37,262	4,615	2,799	1,690	3,911	2,482	421	2,847	1,794	712	253	154	2,003	5,236	1,496	1,006	425	614	4,799
13.0 to 15.0	31,486	4,326	2,592	1,462	3,856	2,006	459	2,755	1,740	760	236	152	1,321	3,002	1,194	968	494	463	3,691
15.0 to 17.0	24,184	3,094	2,315	1,057	3,118	1,500	473	2,233	1,134	849	220	204	1,007	1,505	875	825	348	381	3,039
17.0 to 19.0	16,855	2,039	1,637	610	2,444	972	324	1,651	948	793	151	112	642	869	513	618	185	264	2,076
19.0 to 21.0	10,636	1,242	1,220	311	1,482	537	255	981	575	513	95	90	369	609	298	379	105	140	1,428
21.0 to 29.0	17,773	1,938	2,278	771	2,227	664	390	1,388	960	1,110	147	76	551	1,565	409	621	74	177	2,420
29.0+	3,303	400	341	118	338	74	74	123	251	137	24	8	39	598	45	21	0	76	629
Total	141,501	17,657	13,185	6,021	17,377	8,238	2,398	11,981	7,406	4,878	1,129	797	5,935	13,385	4,831	4,440	1,633	2,118	18,085
North:																			
5.0 to 7.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.0 to 9.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9.0 to 11.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11.0 to 13.0	66,456	6,630	6,227	3,651	5,862	3,785	1,647	5,958	5,450	2,703	476	414	3,272	6,116	2,269	2,224	510	2,059	7,193
13.0 to 15.0	56,723	6,243	5,944	3,099	5,808	3,093	1,588	5,527	4,271	2,607	392	385	2,254	3,456	1,848	2,505	596	1,639	5,459
15.0 to 17.0	43,076	4,354	4,887	2,253	4,952	2,281	1,232	4,280	2,779	2,338	400	398	1,668	1,686	1,381	2,243	430	1,205	4,301
17.0 to 19.0	30,271	2,960	3,650	1,518	3,807	1,523	899	3,325	1,906	1,724	273	307	988	968	807	1,700	249	755	2,902
19.0 to 21.0	19,242	1,956	2,577	837	2,376	841	638	2,128	1,076	1,122	194	206	554	636	582	993	139	406	1,973
21.0 to 29.0	30,614	3,066	4,280	1,660	3,829	1,152	1,025	3,179	1,641	1,938	208	282	836	1,576	713	1,453	127	465	3,177
29.0+	5,421	766	708	356	604	141	154	324	344	206	24	12	80	603	50	167	7	89	778
Total	251,806	25,978	28,276	13,378	27,242	12,819	7,186	24,724	17,471	12,640	1,971	2,007	9,655	15,043	7,653	11,288	2,061	6,621	25,785
Southeast:																			
9.0 to 11.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11.0 to 13.0	21,417	2,374	765	1,493	3,567	1,371	10	90	1,160	159	2,695	3,326	614	15	111	2,118	51	26	1,464
13.0 to 15.0	22,236	2,332	925	1,547	3,641	1,534	17	91	1,151	220	2,867	3,525	588	27	113	2,228	49	29	1,345
15.0 to 17.0	18,414	1,778	881	1,285	3,079	1,347	26	81	863	222	2,159	2,988	508	39	106	1,866	28	17	1,133
17.0 to 19.0	14,024	1,222	773	1,121	2,380	890	15	70	771	244	1,645	2,094	385	28	79	1,399	49	11	840
19.0 to 21.0	9,295	850	537	880	1,701	602	14	41	504	132	978	1,276	254	17	48	876	30	7	539
21.0 to 29.0	13,808	1,169	1,140	1,727	2,908	868	23	92	642	327	1,180	1,579	256	44	61	1,035	17	3	729
29.0+	3,106	335	316	562	708	145	2	27	71	45	187	271	48	41	0	170	7	0	166
Total	102,303	10,063	5,340	8,617	17,987	6,761	109	493	5,164	1,352	11,714	15,062	2,656	214	520	9,696	234	94	6,219
Southcentral:																			
9.0 to 11.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11.0 to 13.0	24,409	2,625	1,040	2,556	4,596	2,828	6	114	366	199	3,299	2,161	739	111	59	908	97	79	2,617
13.0 to 15.0	24,211	2,692	1,222	2,322	4,800	2,467	5	142	283	263	3,264	2,071	750	166	80	1,016	74	44	2,543
15.0 to 17.0	19,433	1,991	1,053	1,767	4,004	1,960	0	97	266	333	2,302	1,593	668	241	57	822	50	33	2,188
17.0 to 19.0	13,013	1,233	741	1,212	2,790	1,277	0	57	149	234	1,478	1,010	489	157	56	456	20	16	1,629
19.0 to 21.0	8,974	650	622	883	1,733	974	0	58	65	224	1,001	704	387	194	19	373	5	7	1,068
21.0 to 29.0	13,392	913	1,038	1,429	2,794	1,582	13	63	93	364	1,160	808	579	492	54	458	0	5	1,530
29.0+	2,236	151	197	221	731	241	2	5	8	36	124	84	30	149	1	72	0	0	177
Total	105,671	10,259	5,916	10,392	21,451	11,333	27	540	1,233	1,655	12,631	8,434	3,645	1,513	328	4,108	248	187	11,764

See footnote at end of table.

TABLE 15.—*Net volume of sawtimber on commercial timberland in the East by species, diameter class, and timber supply region, January 1, 1970* [1]—Continued

[Million board feet, International ¼-inch log rule]

Timber supply region and diameter class (inches)	Hardwoods																		
	Total hardwoods	Select white oaks	Select red oaks	Other white oaks	Other red oaks	Hickory	Yellow birch	Hard maple	Soft maple	Beech	Sweetgum	Tupelo and blackgum	Ash	Cottonwood and aspen	Basswood	Yellow-poplar	Black walnut	Black cherry	Other eastern hardwoods
South:																			
5.0 to 7.0																			
7.0 to 9.0																			
9.0 to 11.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11.0 to 13.0	45,827	4,999	1,806	4,050	8,164	4,200	16	205	1,526	358	5,995	5,487	1,354	126	170	3,026	149	105	4,082
13.0 to 15.0	46,447	5,024	2,147	3,869	8,442	4,002	22	233	1,434	484	6,131	5,596	1,339	193	193	3,245	123	74	3,888
15.0 to 17.0	37,848	3,769	1,935	3,052	7,084	3,308	26	178	1,129	555	4,462	4,582	1,176	281	164	2,689	78	51	3,321
17.0 to 19.0	27,037	2,456	1,514	2,334	5,171	2,168	15	127	920	479	3,124	3,105	875	186	135	1,856	70	27	2,470
19.0 to 21.0	18,270	1,500	1,159	1,764	3,435	1,577	14	99	570	356	1,979	1,981	641	212	68	1,249	36	14	1,608
21.0 to 29.0	27,200	2,083	2,179	3,156	5,702	2,451	36	156	735	692	2,341	2,387	835	537	116	1,494	17	9	2,268
29.0+	5,343	487	513	783	1,439	387	4	32	80	81	312	355	78	190	1	243	7	0	344
Total	207,974	20,322	11,257	19,010	39,438	18,095	136	1,033	6,398	3,007	24,346	23,497	6,301	1,727	849	13,804	483	281	17,984
Summary of the East:																			
9.0 to 11.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11.0 to 13.0	112,283	11,630	8,034	7,701	14,026	7,985	1,664	6,164	6,976	3,061	6,471	5,902	4,627	6,242	2,440	5,251	660	2,165	11,276
13.0 to 15.0	103,171	11,268	8,092	6,968	14,250	7,095	1,610	5,760	5,706	3,091	6,524	5,982	3,593	3,650	2,042	5,750	720	1,714	9,347
15.0 to 17.0	80,924	8,124	6,823	5,305	12,036	5,589	1,259	4,459	3,909	2,893	4,862	4,980	2,845	1,967	1,546	4,933	508	1,256	7,623
17.0 to 19.0	57,309	5,416	5,164	3,853	8,978	3,691	915	3,453	2,827	2,203	3,397	3,413	1,863	1,155	943	3,557	319	783	5,372
19.0 to 21.0	37,512	3,457	3,737	2,602	5,812	2,419	652	2,228	1,646	1,478	2,174	2,188	1,196	848	650	2,242	175	420	3,581
21.0 to 29.0	57,815	5,150	6,459	4,816	9,531	3,604	1,061	3,335	2,377	2,630	2,550	2,670	1,671	2,114	829	2,947	144	474	5,445
29.0+	10,764	1,253	1,222	1,140	2,043	529	159	357	425	287	336	368	159	793	51	410	15	89	1,122
Total	459,781	46,300	39,534	32,388	66,680	30,914	7,323	25,757	23,869	15,648	26,318	25,505	15,957	16,771	8,502	25,093	2,544	6,903	43,769

[1] Data may not add to totals because of truncating. Zeros indicate no data or negligible amounts.

TABLE 16.—*Net volume of sawtimber on commercial timberland in the West, by species, diameter class, and timber supply region, January 1, 1970* [1]

[Million board feet, International ¼-inch log rule]

Timber supply region and diameter class (inches)	Total all species	Softwoods															Hardwoods				
		Total softwoods	Douglas-fir	Ponderosa and Jeffrey pine	True firs	Western hemlock	Sugar pine	Western white pine	Redwood	Sitka spruce	Engelmann and other spruce	Western larch	Western redcedar	Incense-cedar	Lodgepole pine	Other western softwoods	Total western hardwoods	Cottonwood and aspen	Red alder	Oak	Other western hardwoods
PNW Douglas-fir:																					
11.0 to 13.0	30,570	24,156	11,204	172	2,956	7,691	36	183	10	296	24	7	1,063	77	328	109	6,414	84	4,641	227	1,462
13.0 to 15.0	35,612	29,193	14,300	139	3,492	9,128	82	258	6	241	45	11	1,028	91	300	72	6,419	84	4,818	111	1,406
15.0 to 17.0	38,226	32,652	15,953	196	4,092	9,998	94	227	8	422	66	15	1,097	159	208	117	5,574	196	4,140	113	1,125
17.0 to 19.0	38,802	34,052	17,018	232	4,168	10,145	98	312	12	346	66	29	1,254	154	118	100	4,750	185	3,302	115	1,148
19.0 to 21.0	37,461	33,825	16,965	217	4,162	9,952	126	314	5	372	60	22	1,218	170	92	150	3,636	139	2,424	90	983
21.0 to 29.0	136,170	127,948	65,053	947	15,904	36,475	800	1,116	66	1,484	212	133	4,539	652	47	520	8,222	507	4,345	254	3,116
29.0+	283,373	280,515	174,351	2,414	23,922	50,799	3,411	1,159	391	5,557	79	52	15,455	2,032	0	893	2,858	235	846	74	1,703
Total	600,214	562,341	314,844	4,317	58,696	134,188	4,647	3,569	498	8,718	552	269	25,654	3,335	1,093	1,961	37,873	1,430	24,516	984	10,943
PNW ponderosa pine:																					
11.0 to 13.0	16,851	16,729	3,620	3,066	3,222	243	43	307	0	0	657	1,350	122	18	3,595	486	122	82	5	0	35
13.0 to 15.0	17,157	17,116	3,815	3,649	3,511	368	26	287	0	0	674	1,590	139	8	2,627	422	41	36	0	0	5
15.0 to 17.0	17,195	17,178	3,946	4,439	3,675	407	36	331	0	0	735	1,397	139	26	1,676	371	17	12	0	0	5
17.0 to 19.0	16,883	16,832	3,856	5,252	3,614	393	27	252	0	0	739	1,262	128	27	980	302	51	44	1	0	6
19.0 to 21.0	15,540	15,494	3,763	4,515	3,616	365	42	257	0	0	666	1,159	97	42	675	297	46	40	0	0	6
21.0 to 29.0	52,427	52,235	11,727	22,951	8,885	1,360	97	574	0	0	1,516	3,569	286	225	356	689	192	176	2	0	14
29.0+	46,591	46,548	11,145	23,925	6,584	855	93	413	0	0	724	1,825	329	217	12	426	43	26	0	0	17
Total	182,644	182,132	41,872	67,797	33,107	3,991	364	2,421	0	0	5,711	12,152	1,240	563	9,921	2,993	512	416	8	0	88
Alaska—Coastal:																					
11.0 to 13.0	5,821	5,657	0	0	4	3,532	0	0	0	1,530	0	0	188	0	0	400	164	139	20	0	4
13.0 to 15.0	8,399	8,227	0	0	10	5,305	0	0	0	2,101	1	0	257	0	0	551	171	146	20	0	4
15.0 to 17.0	10,490	10,326	0	0	15	6,772	0	0	0	2,498	2	0	287	0	0	749	164	140	20	0	3
17.0 to 19.0	12,661	12,488	0	0	21	8,523	0	0	0	2,922	3	0	388	0	0	629	173	148	21	0	4
19.0 to 21.0	13,032	12,875	0	0	22	8,437	0	0	0	3,231	3	0	379	0	0	801	156	134	18	0	4
21.0 to 29.0	52,530	52,225	0	0	109	34,661	0	0	0	14,079	3	0	1,709	0	0	1,662	305	261	36	0	7
29.0+	76,439	76,301	0	0	174	40,213	0	0	0	32,821	0	0	1,978	0	0	1,113	137	117	16	0	4
Total	179,375	178,101	0	0	358	107,446	0	0	0	59,185	14	0	5,188	0	0	5,907	1,273	1,087	153	0	32
California and Hawaii:																					
11.0 to 13.0	7,036	6,409	1,270	1,382	2,491	8	347	35	309	1	0	0	0	288	181	97	627	0	12	226	389
13.0 to 15.0	10,159	9,363	2,005	1,933	3,327	41	505	67	735	2	0	0	4	405	234	105	795	33	21	258	483
15.0 to 17.0	11,829	11,063	2,574	2,194	3,770	11	601	93	996	14	0	0	2	426	263	119	766	17	23	207	519
17.0 to 19.0	12,472	11,706	2,931	2,282	3,791	30	666	91	1,094	18	0	0	0	453	253	97	765	8	20	223	514
19.0 to 21.0	13,439	12,733	3,264	2,464	4,081	11	728	92	1,198	40	4	0	5	477	270	99	706	1	18	182	505
21.0 to 29.0	59,480	57,715	14,366	11,650	18,671	152	3,511	411	4,806	115	11	0	12	2,256	1,232	522	1,765	5	41	587	1,132
29.0+	163,990	162,679	53,408	30,067	42,236	113	12,145	1,116	13,991	82	14	0	38	5,763	2,737	969	1,310	13	30	397	870
Total	278,406	271,671	79,818	51,972	78,367	366	18,503	1,905	23,129	272	29	0	61	10,068	5,170	2,011	6,735	77	165	2,080	4,413
Pacific Coast:																					
11.0 to 13.0	60,278	52,951	16,094	4,620	8,673	11,474	426	525	319	1,827	681	1,357	1,373	383	4,104	1,092	7,327	305	4,678	453	1,890
13.0 to 15.0	71,328	63,900	20,120	5,721	10,340	14,842	613	612	741	2,344	720	1,601	1,428	504	3,161	1,151	7,427	299	4,859	369	1,899
15.0 to 17.0	77,740	71,219	22,473	6,829	11,552	17,188	731	651	1,004	2,934	803	1,412	1,525	611	2,147	1,356	6,521	365	4,183	320	1,652
17.0 to 19.0	80,818	75,079	23,805	7,766	11,594	19,091	791	655	1,106	3,286	808	1,291	1,770	634	1,351	1,128	5,739	385	3,344	338	1,672
19.0 to 21.0	79,472	74,928	23,992	7,196	11,881	18,765	896	663	1,203	3,643	733	1,181	1,699	689	1,037	1,348	4,544	314	2,460	272	1,498
21.0 to 29.0	300,607	290,123	91,146	35,548	43,569	72,648	4,408	2,101	4,872	15,678	1,742	3,702	6,546	3,133	1,635	3,393	10,484	949	4,424	841	4,269
29.0+	570,393	566,044	238,904	56,406	72,916	91,980	15,649	2,688	14,382	38,460	817	1,877	17,800	8,012	2,749	3,402	4,349	391	892	471	2,594
Total	1,240,640	1,194,245	436,534	124,086	170,528	245,991	23,514	7,895	23,627	68,175	6,306	12,421	32,143	13,966	16,184	12,872	46,394	3,010	24,842	3,064	15,477

See footnotes at end of table.

TABLE 16.—*Net volume of sawtimber on commercial timberland in the West, by species, diameter class, and timber supply region, January 1, 1970* [1]—Continued

[Million board feet, International ¼-inch log rule]

Timber supply region and diameter class (inches)	Total all species	Softwoods															Hardwoods				
		Total softwoods	Douglas-fir	Ponderosa and Jeffrey pine	True firs	Western hemlock	Sugar pine	Western white pine	Redwood	Sitka spruce	Engelmann and other spruce	Western larch	Western redcedar	Incense-cedar	Lodgepole pine	Other western softwoods	Total western hardwoods	Cottonwood and aspen	Red alder	Oak	Other western hardwoods
Northern Rocky Mountain: [2]																					
9.0 to 11.0	39,607	39,607	7,432	2,412	5,359	548	0	991	0	0	2,396	2,189	748	0	16,776	753	0	0	0	0	0
11.0 to 13.0	37,239	36,753	8,652	3,359	5,059	665	0	1,393	0	0	3,019	2,210	807	0	10,919	666	485	419	0	0	65
13.0 to 15.0	32,962	32,550	9,248	3,694	4,953	572	0	1,181	0	0	3,140	2,153	903	0	6,229	473	411	364	0	0	47
15.0 to 17.0	28,435	28,140	8,697	3,458	4,142	556	0	1,431	0	0	3,394	2,153	927	0	3,035	342	295	270	0	0	25
17.0 to 19.0	23,771	23,561	7,651	2,984	3,409	536	0	1,294	0	0	3,085	2,002	896	0	1,479	222	209	198	0	0	11
19.0 to 21.0	19,655	19,485	6,704	2,470	2,768	424	0	1,339	0	0	2,437	1,696	839	0	665	140	169	148	0	0	21
21.0 to 29.0	48,940	48,481	15,605	6,639	7,262	1,244	0	3,682	0	0	6,349	4,555	2,358	0	504	278	458	408	0	0	50
29.0+	22,881	22,805	6,343	5,831	2,536	443	0	1,589	0	0	2,842	1,872	1,273	0	8	66	75	67	0	0	7
Total	253,492	251,387	70,334	30,850	35,492	4,992	0	12,902	0	0	26,665	18,835	8,753	0	39,617	2,943	2,105	1,876	0	0	229
Southern Rocky Mountain: [2]																					
9.0 to 11.0	12,521	12,521	1,447	1,066	2,404	0	0	0	0	0	4,189	0	0	0	3,127	284	0	0	0	0	0
11.0 to 13.0	14,944	12,157	1,349	1,941	1,985	0	0	1	0	0	4,202	0	0	0	2,388	287	2,787	2,784	0	0	2
13.0 to 15.0	14,480	12,555	1,656	2,783	1,760	0	0	2	0	0	4,192	0	0	0	1,914	245	1,924	1,924	0	0	0
15.0 to 17.0	13,958	12,794	1,737	3,947	1,536	1	0	2	0	0	4,225	0	0	0	1,111	232	1,163	1,162	0	0	0
17.0 to 19.0	12,510	11,807	1,623	4,319	1,382	2	0	2	0	0	3,881	0	0	0	464	131	703	702	0	0	1
19.0 to 21.0	10,309	9,974	1,433	4,267	939	1	0	4	0	0	2,916	0	0	0	287	123	335	333	0	0	1
21.0 to 29.0	24,823	24,541	3,113	12,834	1,833	12	0	22	0	0	6,334	0	0	2	167	221	281	280	0	0	1
29+	7,367	7,366	1,410	3,801	908	9	5	38	0	0	1,133	0	0	2	10	47	0	0	0	0	0
Total	110,915	103,719	13,771	34,961	12,751	28	5	73	0	0	31,076	0	0	6	9,470	1,572	7,196	7,189	0	0	6
Rocky Mountain:																					
9.0 to 11.0	52,129	52,129	8,880	3,478	7,764	548	0	991	0	0	6,586	2,189	748	0	19,903	1,037	0	0	0	0	0
11.0 to 13.0	52,183	48,911	10,002	5,300	7,045	666	0	1,395	0	0	7,221	2,210	807	0	13,307	954	3,272	3,204	0	0	67
13.0 to 15.0	47,442	45,106	10,904	6,477	6,713	573	0	1,184	0	0	7,332	2,153	903	0	8,143	719	2,336	2,288	0	0	47
15.0 to 17.0	42,393	40,934	10,434	7,406	5,679	557	0	1,433	0	0	7,620	2,153	927	0	4,146	575	1,459	1,432	9	0	26
17.0 to 19.0	36,282	35,369	9,275	7,303	4,791	538	0	1,296	0	0	6,967	2,002	896	0	1,944	353	912	900	0	0	12
19.0 to 21.0	29,965	29,460	8,137	6,738	3,707	426	0	1,344	0	0	5,353	1,696	839	1	952	263	505	481	0	0	23
21.0 to 29.0	73,763	73,023	18,718	19,474	9,096	1,257	0	3,704	0	0	12,684	4,555	2,358	2	672	499	740	689	0	0	51
29.0+	30,248	30,172	7,753	9,632	3,445	452	5	1,627	0	0	3,976	1,872	1,273	2	18	113	76	68	0	0	7
Total	364,408	355,106	84,106	65,811	48,243	5,020	5	12,976	0	0	57,742	18,835	8,753	6	49,088	4,516	9,301	9,066	0	0	235
Summary of the West:																					
9.0 to 11.0	52,129	52,129	8,880	3,478	7,764	548	0	991	0	0	6,586	2,189	748	0	19,903	1,037	0	0	0	0	0
11.0 to 13.0	112,462	101,862	26,096	9,920	15,719	12,140	426	1,920	319	1,827	7,903	3,567	2,180	383	17,411	2,047	10,599	3,510	4,678	453	1,958
13.0 to 15.0	118,770	109,006	31,024	12,198	17,054	15,415	613	1,796	741	2,344	8,052	3,754	2,332	504	11,304	1,870	9,763	2,588	4,859	369	1,946
15.0 to 17.0	120,134	112,153	32,907	14,235	17,231	17,746	731	2,084	1,004	2,934	8,423	3,565	2,453	611	6,293	1,931	7,980	1,798	4,183	320	1,679
17.0 to 19.0	117,100	110,448	33,080	15,069	16,386	19,629	791	1,951	1,106	3,286	7,775	3,293	2,666	634	3,295	1,482	6,652	1,285	3,344	338	1,684
19.0 to 21.0	109,438	104,388	32,129	13,934	15,589	19,191	896	2,007	1,203	3,643	6,087	2,877	2,538	689	1,989	1,612	5,049	796	2,460	272	1,521
21.0 to 29.0	374,371	363,146	109,864	55,022	52,665	73,905	4,408	5,805	4,872	15,678	14,426	8,257	8,904	3,135	2,307	3,893	11,225	1,638	4,424	841	4,321
29.0+	600,642	596,217	246,657	66,038	76,361	92,433	15,654	4,315	14,382	38,460	4,793	3,749	19,073	8,014	2,767	3,515	4,425	459	892	471	2,602
Total	1,605,048	1,549,352	520,640	189,897	218,772	251,011	23,519	20,871	23,627	68,175	64,049	31,256	40,896	13,972	65,272	17,389	55,696	12,077	24,842	3,064	15,713

[1] Data may not add to totals because of truncating. Zeros indicate no data or negligible amounts.

[2] See footnote 2, table 3.

TABLE 17.—*Net volume of growing stock on commercial timberland in the East, by species and section, region, and State January 1, 1970* [1]

[Million cubic feet]

Section, region, and State	Total all species	Softwoods										
		Total softwoods	Longleaf and slash pines	Shortleaf and loblolly pines	Other yellow pines	Eastern white and red pines	Jack pine	Spruce and balsam fir	Eastern hemlock	Cypress	Other eastern softwoods	Ponderosa and Jeffrey pine
New England:												
Connecticut	1,898	228	0	0	3	57	0	0	135	0	34	0
Maine	21,253	14,763	0	0	0	1,517	0	10,756	1,151	0	1,339	0
Massachusetts	2,717	770	0	0	67	395	0	44	258	0	6	0
New Hampshire	5,147	2,902	0	0	0	1,267	0	1,159	460	0	15	0
Rhode Island	267	20	0	0	0	15	0	0	0	0	5	0
Vermont	3,928	1,508	0	0	0	314	0	796	337	0	61	0
Total	35,210	20,191	0	0	70	3,565	0	12,755	2,341	0	1,460	0
Middle Atlantic:												
Delaware	657	229	0	175	54	0	0	0	0	0	0	0
Maryland	3,074	531	0	308	192	0	0	0	20	0	11	0
New Jersey	1,729	385	0	6	300	23	0	0	28	0	28	0
New York	12,517	3,291	0	0	21	1,321	0	673	1,121	0	155	0
Pennsylvania	20,271	1,600	0	0	184	584	0	11	796	0	26	0
West Virgina	14,086	657	0	73	272	85	0	78	145	0	5	0
Total	52,334	6,693	0	562	1,023	2,013	0	762	2,110	0	225	0
Lake States:												
Michigan	16,558	4,313	0	0	0	724	412	1,399	642	0	1,136	0
Minnesota	11,727	3,896	0	0	0	665	886	1,735	0	0	610	0
North Dakota	276	0	0	0	0	0	0	0	0	0	0	0
South Dakota (East)	102	19	0	0	0	0	0	0	0	0	0	19
Wisconsin	11,411	2,663	0	0	0	698	452	662	360	0	491	0
Total	40,074	10,891	0	0	0	2,087	1,750	3,796	1,002	0	2,237	19
Central:												
Illinois	2,328	19	0	16	0	0	0	0	0	2	2	0
Indiana	3,607	70	0	13	26	0	0	0	0	11	20	0
Iowa	1,807	4	0	0	0	0	0	0	0	0	4	0
Kansas	534	0	0	0	0	0	0	0	0	0	0	0
Kentucky	8,547	622	0	234	258	10	0	0	45	8	66	0
Missouri	6,496	385	0	353	0	0	0	0	0	11	21	0
Nebraska	506	115	0	0	0	0	1	0	0	0	4	109
Ohio	4,233	124	0	0	80	28	0	0	8	0	8	0
Total	28,058	1,339	0	616	364	38	1	0	53	32	125	109
Total, North	155,676	39,114	0	1,178	1,457	7,703	1,751	17,313	5,506	32	4,047	128
South Atlantic:												
North Carolina	19,680	8,509	358	5,834	1,565	254	0	8	114	296	80	0
South Carolina	12,700	6,369	903	4,336	583	19	0	0	4	478	47	0
Virginia	15,171	4,216	0	2,520	1,349	157	0	1	92	48	48	0
Total	47,551	19,094	1,261	12,690	3,497	430	0	9	210	822	175	0
East Gulf:												
Florida	10,888	6,904	4,039	511	435	0	0	0	0	1,845	74	0
Georgia	19,695	11,839	4,305	6,272	495	65	0	0	10	687	5	0
Total	30,583	18,743	8,344	6,783	930	65	0	0	10	2,532	79	0
Central Gulf:												
Alabama	16,010	9,232	2,029	6,634	421	0	0	0	0	114	35	0
Mississippi	13,878	7,189	1,281	5,578	145	0	0	0	0	161	24	0
Tennessee	10,396	1,800	0	819	642	151	0	0	55	29	104	0
Total	40,284	18,221	3,310	13,031	1,208	151	0	0	55	304	163	0
West Gulf:												
Arkansas	15,366	6,539	0	6,303	0	0	0	0	0	187	49	0
Louisiana	13,602	7,596	674	5,725	107	0	0	0	0	1,088	2	0
Oklahoma	1,648	850	0	845	0	0	0	0	0	1	5	0
Texas	10,483	7,361	266	7,016	0	0	0	0	0	67	13	0
Total	41,099	22,346	940	19,889	107	0	0	0	0	1,343	69	0
Total, South	159,517	78,404	13,855	52,393	5,742	646	0	9	275	5,001	486	0
Total, Eastern United States	315,193	117,518	13,855	53,571	7,199	8,349	1,751	17,322	5,781	5,033	4,533	128

See footnote at end of table.

TABLE 17.—*Net volume of growing stock on commercial timberland in the East, by species and section, region, and State, January 1, 1970* [1]—Continued

[Million cubic feet]

	Total hardwoods	Hardwoods																
		Select white oaks	Select red oaks	Other white oaks	Other red oaks	Hickory	Yellow birch	Hard maple	Soft maple	Beech	Sweetgum	Tupelo and blackgum	Ash	Cottonwood and aspen	Basswood	Yellow-poplar	Black walnut	Black cherry	Other eastern hardwoods
New England:																			
Connecticut	1,670	222	407	65	167	95	137	53	306	30	0	0	56	0	7	31	0	0	93
Maine	6,490	0	306	0	0	0	744	1,230	1,615	658	0	0	293	665	87	0	0	0	891
Massachusetts	1,947	122	554	30	52	18	75	163	428	76	0	0	72	42	37	0	0	0	278
New Hampshire	2,246	45	245	0	29	0	356	273	303	286	0	0	51	83	0	0	0	0	572
Rhode Island	247	33	64	0	32	10	0	0	73	0	0	0	10	0	0	0	0	0	24
Vermont	2,420	8	79	0	8	13	307	855	286	232	0	0	152	92	21	0	0	45	324
Total	15,020	430	1,655	95	288	136	1,619	2,574	3,011	1,282	0	0	634	882	153	31	0	45	2,182
Middle Atlantic:																			
Delaware	428	63	51	22	58	6	0	0	51	12	74	27	0	0	0	36	0	0	31
Maryland	2,543	341	191	200	435	109	0	21	148	75	229	112	56	17	0	407	27	0	175
New Jersey	1,344	207	184	133	291	33	0	0	129	14	76	35	51	0	0	75	0	0	116
New York	9,226	260	833	234	132	262	405	2,045	1,656	798	0	0	615	425	393	41	2	326	799
Pennsylvania	18,670	1,654	2,648	2,169	1,368	537	211	1,412	2,977	742	0	89	671	551	305	569	41	1,661	1,066
West Virginia	13,428	1,197	1,613	1,484	1,369	1,293	215	760	731	831	0	219	295	0	422	1,336	127	357	1,179
Total	45,639	3,722	5,520	4,242	3,653	2,240	831	4,238	5,692	2,472	379	482	1,688	993	1,120	2,464	197	2,344	3,366
Lake States:																			
Michigan	12,245	441	837	0	434	112	496	2,454	1,337	468	0	0	608	2,789	525	9	4	168	1,564
Minnesota	7,831	265	481	0	0	0	23	180	125	0	0	0	530	3,792	452	0	0	0	1,983
North Dakota	276	33	0	0	0	0	0	0	9	0	0	0	41	122	24	0	0	0	49
South Dakota (East)	83	4	0	0	0	0	0	0	1	0	0	0	21	31	2	0	0	0	22
Wisconsin	8,748	414	1,010	0	376	111	223	958	665	26	0	0	521	2,254	575	0	8	72	1,535
Total	29,183	1,157	2,328	0	810	223	742	3,592	2,137	494	0	0	1,721	8,988	1,578	9	12	240	5,153
Central:																			
Illinois	2,308	394	135	84	346	247	0	64	176	8	51	11	161	85	15	21	47	461	0
Indiana	3,537	560	278	124	431	455	0	296	130	135	51	31	198	97	32	188	67	50	413
Iowa	1,804	172	164	147	85	85	0	33	147	0	0	0	74	184	109	0	69	25	512

Kansas	534	51	28	12	21	23	0	3	9	0	0	0	40	104	4	0	40	0	199
Kentucky	7,925	1,156	405	736	1,600	1,108	2	220	264	355	190	156	224	56	64	733	78	0	577
Missouri	6,111	1,369	299	926	1,793	589	0	56	63	0	34	26	113	35	0	2	133	0	674
Nebraska	392	43	4	1	0	2	0	0	0	0	0	0	38	191	8	0	4	0	99
Ohio	4,109	596	316	254	434	489	0	243	231	152	0	0	273	57	48	268	100	124	525
Total	26,720	4,341	1,632	2,284	4,710	2,998	2	915	1,020	650	326	224	1,121	809	280	1,212	538	660	3,001
Total, North	116,562	9,650	11,135	6,621	9,461	5,597	3,194	11,319	11,860	4,898	705	706	5,164	11,672	3,131	3,716	747	3,289	13,702
South Atlantic:																			
North Carolina	11,171	1,140	513	855	1,493	652	32	58	874	142	1,337	1,756	260	7	72	1,204	28	32	717
South Carolina	6,330	415	145	249	1,326	292	0	4	357	25	1,199	1,294	228	56	1	361	4	5	370
Virginia	10,955	1,876	816	1,340	1,804	929	12	90	578	227	648	382	162	4	90	1,298	57	23	618
Total	28,456	3,431	1,474	2,444	4,623	1,873	44	152	1,809	394	3,184	3,432	650	67	163	2,863	89	60	1,705
East Gulf:																			
Florida	3,984	32	5	302	773	113	0	12	276	10	383	1,150	265	2	18	34	0	4	604
Georgia	7,856	546	261	566	1,462	538	2	7	437	36	1,125	1,482	240	3	8	562	7	17	557
Total	11,840	578	266	868	2,235	651	2	19	713	46	1,508	2,632	505	5	26	596	7	21	1,161
Central Gulf:																			
Alabama	6,778	574	221	515	1,303	806	0	11	125	95	943	836	224	12	27	406	8	9	661
Mississippi	6,689	562	280	538	1,473	575	0	0	96	61	1,034	622	176	104	11	248	5	26	880
Tennessee	8,596	1,305	555	1,017	1,486	1,197	9	200	264	138	337	196	259	55	53	724	73	54	673
Total	22,063	2,441	1,056	2,070	4,262	2,578	9	211	485	294	2,314	1,654	659	171	91	1,378	86	89	2,214
West Gulf:																			
Arkansas	8,827	1,224	623	1,198	1,959	1,012	0	24	59	52	1,140	314	222	82	14	3	30	22	848
Louisiana	6,007	228	125	458	976	542	0	1	112	90	1,003	871	391	77	3	14	1	6	1,108
Oklahoma	798	66	30	188	166	113	0	3	5	0	45	19	34	16	1	0	3	0	109
Texas	3,122	173	114	461	804	217	0	1	26	20	629	189	111	6	5	0	1	1	364
Total	18,754	1,691	892	2,305	3,905	1,884	0	29	202	162	2,817	1,393	758	181	23	17	35	29	2,429
Total, South	81,113	8,141	3,688	7,687	15,025	6,986	55	411	3,209	896	9,823	9,111	2,572	424	303	4,854	217	199	7,509
Total Eastern United States	197,675	17,791	14,823	14,308	24,486	12,583	3,249	11,730	15,069	5,794	10,528	9,817	7,736	12,096	3,434	8,570	967	3,488	21,211

[1] Data may not add to totals because of rounding. Zeros indicate no data or negligible amounts.

TABLE 18.—*Net volume of growing stock on commercial timberland in the West, by species and section, region, and State, January 1, 1970* [1]

[Million cubic feet]

Section, region, and State	Total all species	Softwoods															Hardwoods				
		Total softwoods	Douglas-fir	Ponderosa and Jeffrey pine	True firs	Western hemlock	Sugar pine	Western white pine	Redwood	Sitka spruce	Engelmann and other spruce	Western larch	Western redcedar	Incense-cedar	Lodgepole pine	Other western softwoods	Total western hardwoods	Cottonwood and aspen	Red alder	Oak	Other western hardwoods
Pacific Northwest:																					
Alaska: Coastal	34,768	34,469	0	0	65	20,981	0	0	0	11,148	3	0	1,005	0	0	1,267	299	255	36	0	8
Oregon:																					
Western	62,817	56,823	37,749	760	4,782	8,429	776	579	81	1,053	82	26	1,348	600	293	265	5,994	80	3,756	453	1,705
Eastern	24,276	24,238	3,370	9,052	4,830	117	70	148	0	0	740	1,029	16	107	3,863	896	38	26	8	0	4
Summary	87,093	81,061	41,119	9,812	9,612	8,546	846	727	81	1,053	822	1,055	1,364	707	4,156	1,161	6,032	106	3,764	453	1,709
Washington:																					
Western	47,323	42,336	15,623	33	6,000	16,146	0	111	0	625	30	11	3,486	0	131	140	4,987	163	3,770	8	1,046
Eastern	17,792	17,621	5,867	3,771	2,793	661	0	311	0	0	627	1,733	289	0	1,497	72	171	103	3	0	65
Summary	65,115	59,957	21,490	3,804	8,793	16,807	0	422	0	625	657	1,744	3,775	0	1,628	212	5,158	266	3,773	8	1,111
Total	186,976	175,487	62,609	13,616	18,470	46,334	846	1,149	81	12,826	1,482	2,799	6,144	707	5,784	2,640	11,489	627	7,573	461	2,828
Pacific Southwest:																					
California	54,251	51,152	15,018	9,783	14,744	80	3,497	352	4,347	42	5	0	10	1,883	999	392	3,099	40	65	1,145	1,849
Hawaii	239	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4	235	0	0	0	235
Total	54,490	51,156	15,018	9,783	14,744	80	3,497	352	4,347	42	5	0	10	1,883	999	396	3,334	40	65	1,145	2,084
Total, Pacific Coast	241,466	226,643	77,627	23,399	33,214	46,414	4,343	1,501	4,428	12,868	1,487	2,799	6,154	2,590	6,783	3,036	14,823	667	7,638	1,606	4,911
Northern Rocky Mountain:																					
Idaho [2]	29,497	29,258	7,981	2,755	5,942	808	0	2,128	0	0	2,148	1,528	1,681	0	4,113	173	240	146	0	0	94
Montana [2]	28,650	28,376	7,738	2,377	2,364	313	0	352	0	0	2,479	2,426	271	0	9,544	513	274	245	0	0	29
South Dakota (West) [2]	1,007	1,001	0	955	0	0	0	0	0	0	46	0	0	0	0	0	6	0	0	0	6
Wyoming [2]	4,673	4,471	405	758	394	0	0	0	0	0	813	0	0	0	1,942	160	202	202	0	0	0
Total	63,828	63,106	16,124	6,846	8,699	1,122	0	2,479	0	0	5,485	3,955	1,952	0	15,598	846	722	592	0	0	129
Southern Rocky Mountain:																					
Arizona [2]	4,810	4,584	333	3,688	230	0	0	0	0	0	294	0	0	0	0	38	226	226	0	0	0
Colorado [2]	12,267	10,360	1,005	715	1,684	0	0	0	0	0	4,523	0	0	0	2,294	140	1,907	1,904	0	0	3
Nevada [2]	250	237	0	79	96	5	1	12	0	0	20	0	0	1	14	9	13	13	0	0	0
New Mexico [2]	6,336	5,735	1,031	3,244	670	0	0	0	0	0	614	0	0	0	0	176	601	601	0	0	0
Utah [2]	4,728	3,689	741	321	733	0	0	0	0	0	1,005	0	0	0	840	50	1,039	1,039	0	0	0
Total	28,391	24,606	3,109	8,047	3,413	5	1	12	0	0	6,456	0	0	1	3,148	412	3,786	3,783	0	0	3
Total, Rocky Mountain	92,219	87,711	19,234	14,892	12,113	1,126	1	2,492	0	0	11,941	3,955	1,952	1	18,746	1,258	4,507	4,375	0	0	132
Total, Western United States	333,684	314,355	96,861	38,292	45,326	47,540	4,344	3,993	4,428	12,868	13,428	6,754	8,106	2,591	25,530	4,295	19,331	5,043	7,638	1,606	5,043

[1] Data may not add to totals because of rounding. Zeros indicate no data or negligible amounts.

[2] See footnote 2, table 3.

TABLE 19.—*Net volume of sawtimber on commercial timberland in the East by species and section, region, and State, as of January 1, 1970* [1]

[Million board feet, International ¼-inch log rule]

Section, region, and State	Total all species	Softwoods										
		Total softwoods	Longleaf and slash pines	Shortleaf and loblolly pines	Other yellow pines	Eastern white and red pines	Jack pine	Spruce and balsam fir	Eastern hemlock	Cypress	Other eastern softwoods	Ponderosa and Jeffrey pine
New England:												
Connecticut	2,611	346	0	0	6	95	0	0	238	0	7	0
Maine	34,520	23,456	0	0	0	4,568	0	13,838	2,666	0	2,383	0
Massachusetts	3,128	1,324	0	0	48	832	0	30	411	0	3	0
New Hampshire	10,040	6,862	0	0	0	3,701	0	2,064	1,078	0	18	0
Rhode Island	193	25	0	0	0	23	0	0	0	0	3	0
Vermont	6,778	2,800	0	0	0	693	0	1,337	720	0	50	0
Total	57,270	34,813	0	0	54	9,912	0	17,269	5,113	0	2,464	0
Middle Atlantic:												
Delaware	1,361	460	0	418	42	0	0	0	0	0	0	0
Maryland	6,962	1,281	0	798	432	0	0	0	21	0	30	0
New Jersey	4,276	749	0	10	561	26	0	0	99	0	53	0
New York	24,980	7,274	0	0	41	3,116	0	1,178	2,711	0	227	0
Pennsylvania	29,616	3,434	0	0	357	1,400	0	9	1,651	0	17	0
West Virginia	35,686	1,836	0	138	778	257	0	213	441	0	8	0
Total	102,881	15,034	0	1,364	2,211	4,799	0	1,400	4,923	0	335	0
Lake States:												
Michigan	38,087	11,026	0	0	0	3,351	372	1,891	3,189	0	2,221	0
Minnesota	20,067	8,041	0	0	0	3,254	1,863	2,104	0	0	820	0
North Dakota	564	0	0	0	0	0	0	0	0	0	0	0
South Dakota (East)	339	58	0	0	0	0	0	0	0	0	0	58
Wisconsin	22,296	6,963	0	0	0	2,967	611	777	1,688	0	920	0
Total	81,353	26,088	0	0	0	9,572	2,846	4,772	4,877	0	3,961	58
Central:												
Illinois	7,834	25	0	10	0	0	0	0	0	13	1	0
Indiana	11,209	184	0	12	64	0	0	0	0	74	34	0
Iowa	6,597	10	0	0	0	0	0	0	0	0	10	0
Kansas	1,903	1	0	0	0	0	0	0	0	0	1	0
Kentucky	30,200	1,968	0	782	822	35	0	0	154	61	115	0
Missouri	16,050	1,072	0	996	0	0	0	0	0	68	8	0
Nebraska	1,992	489	0	0	0	0	1	0	0	0	7	482
Ohio	14,579	378	0	0	270	56	0	0	30	0	22	0
Total	90,364	4,127	0	1,800	1,156	91	1	0	184	216	198	482
Total, North	331,868	80,062	0	3,164	3,421	24,374	2,847	23,441	15,097	216	6,958	540
South Atlantic:												
North Carolina	58,128	28,612	987	20,630	3,992	971	0	42	442	1,322	226	0
South Carolina	36,434	20,382	2,800	13,989	1,717	68	0	0	13	1,732	62	0
Virginia	39,227	11,885	0	8,066	2,614	549	0	2	380	209	65	0
Total	133,789	60,879	3,787	42,685	8,323	1,588	0	44	835	3,263	353	0
East Gulf:												
Florida	30,464	19,966	11,245	1,983	1,055	0	0	0	0	5,454	228	0
Georgia	52,762	33,868	12,788	17,354	1,260	290	0	0	34	2,138	5	0
Total	83,226	53,834	24,033	19,337	2,315	290	0	0	34	7,592	233	0
Central Gulf:												
Alabama	52,769	34,874	7,914	24,975	1,376	0	0	0	0	550	58	0
Mississippi	44,732	28,079	4,825	21,689	679	0	0	0	0	840	47	0
Tennessee	26,340	4,699	0	1,972	1,668	622	0	0	212	130	95	0
Total	123,841	67,652	12,739	48,636	3,723	622	0	0	212	1,520	200	0
West Gulf:												
Arkansas	46,386	25,252	0	24,258	0	0	0	0	0	940	53	0
Louisiana	53,997	35,012	2,639	26,575	524	0	0	0	0	5,268	6	0
Oklahoma	4,490	2,789	0	2,777	0	0	0	0	0	3	9	0
Texas	38,121	30,459	1,050	29,070	0	0	0	0	0	310	29	0
Total	142,994	93,512	3,689	82,680	524	0	0	0	0	6,521	97	0
Total, South	483,850	275,877	44,248	193,338	14,885	2,500	0	44	1,081	18,896	883	0
Total, Eastern United States	815,718	355,939	44,248	196,502	18,306	26,874	2,847	23,485	16,178	19,112	7,841	540

See footnote at end of table.

TABLE 19.—*Net volume of sawtimber on commercial timberland in the East by species and section, region, and State, as of January 1, 1970* [1]—Continued

[Million board feet, International ¼-inch log rule]

	Hardwoods																		
	Total hardwoods	Select white oaks	Select red oaks	Other white oaks	Other red oaks	Hickory	Yellow birch	Hard maple	Soft maple	Beech	Sweetgum	Tupelo and blackgum	Ash	Cottonwood and aspen	Basswood	Yellow-poplar	Black walnut	Black cherry	Other eastern hardwoods
New England:																			
Connecticut	2,266	382	700	41	300	120	162	40	216	63	0	0	46	0	12	127	0	0	57
Maine	11,064	0	694	0	0	0	1,608	3,235	2,124	999	0	0	492	691	208	0	0	0	1,014
Massachusetts	1,804	93	524	26	139	15	54	214	238	95	0	0	71	3	83	0	0	0	247
New Hampshire	3,179	10	371	0	11	0	774	605	277	508	0	0	94	34	0	0	0	0	495
Rhode Island	168	32	66	0	32	8	0	0	21	0	0	0	5	0	0	0	0	0	3
Vermont	3,978	30	198	0	18	10	595	1,396	396	520	0	0	248	101	37	0	0	50	377
Total	22,459	547	2,553	67	500	153	3,193	5,490	3,272	2,185	0	0	956	829	340	127	0	50	2,193
Middle Atlantic:																			
Delaware	901	143	81	24	110	15	0	0	72	52	161	60	0	0	0	119	0	0	63
Maryland	5,681	755	508	391	1,008	240	0	21	132	173	461	236	72	12	0	1,319	59	0	294
New Jersey	3,527	643	565	184	936	77	0	0	206	36	220	83	115	0	0	283	0	0	180
New York	17,707	677	2,016	418	302	405	969	3,942	2,369	1,823	0	0	986	559	907	131	0	711	1,462
Pennsylvania	26,182	2,514	4,997	2,535	2,533	745	178	1,539	2,823	1,097	0	101	1,012	259	444	1,357	63	2,867	1,119
West Virginia	33,850	3,041	4,342	3,737	4,475	2,947	449	1,751	1,192	2,397	0	730	580	0	1,130	3,511	306	875	2,387
Total	87,848	7,773	12,539	7,289	9,364	4,429	1,596	7,253	6,794	5,578	842	1,210	2,765	830	2,481	6,720	428	4,453	5,505
Lake States:																			
Michigan	27,061	1,148	2,361	0	1,097	293	1,641	6,526	2,670	1,758	0	0	943	4,176	1,181	33	12	212	3,010
Minnesota	12,025	806	1,192	0	0	0	108	626	323	0	0	0	997	3,253	1,401	0	0	0	3,321
North Dakota	564	61	0	0	0	0	0	0	10	0	0	0	75	162	88	0	0	0	168
South Dakota (East)	281	7	0	0	0	0	0	0	3	0	0	0	47	141	2	0	1	0	81
Wisconsin	15,333	1,099	2,896	0	829	109	643	2,120	985	87	0	0	773	2,202	1,012	0	23	73	2,482
Total	55,264	3,121	6,449	0	1,926	402	2,392	9,272	3,991	1,845	0	0	2,835	9,934	3,684	33	36	285	9,062
Central:																			
Illinois	7,809	1,590	662	242	1,216	592	0	216	573	41	207	38	392	388	58	88	110	1,398	0
Indiana	11,026	1,829	1,076	444	1,620	1,243	0	777	339	502	136	100	503	335	114	670	185	109	1,042
Iowa	6,587	1,106	675	30	301	205	0	129	596	0	0	0	261	835	448	0	252	30	1,718
Kansas	1,903	208	100	20	78	68	0	6	31	0	0	0	102	450	16	0	104	0	721

Kentucky	28,232	3,742	1,856	2,688	6,583	3,366	7	629	824	1,710	697	578	603	341	299	2,547	218	0	1,545
Missouri	14,978	3,577	1,104	1,749	3,914	1,114	0	144	271	0	90	82	248	187	0	5	416	0	2,076
Nebraska	1,502	123	20	4	0	6	0	0	0	0	0	0	134	807	30	0	15	0	363
Ohio	14,202	2,360	1,244	845	1,739	1,241	0	809	783	781	0	0	857	108	184	1,098	299	296	1,559
Total	86,239	14,535	6,737	6,022	15,451	7,835	7	2,710	3,417	3,034	1,130	798	3,100	3,451	1,149	4,408	1,599	1,833	9,024
Total, North	251,810	25,976	28,278	13,378	27,241	12,819	7,188	24,725	17,474	12,642	1,972	2,008	9,656	15,044	7,654	11,288	2,063	6,621	25,784
South Atlantic:																			
North Carolina	29,516	3,173	1,594	2,095	4,277	1,736	94	192	1,843	375	3,518	4,695	598	12	209	3,303	80	38	1,681
South Carolina	16,052	914	416	627	3,292	792	0	8	741	70	3,185	3,401	492	164	4	1,098	9	2	836
Virginia	27,343	4,548	2,435	3,425	4,302	2,423	14	246	1,085	745	1,560	919	362	12	238	3,631	129	33	1,235
Total	72,911	8,635	4,445	6,147	11,871	4,951	108	446	3,669	1,190	8,263	9,015	1,452	188	451	8,032	218	73	3,752
East Gulf:																			
Florida	10,498	117	11	1,118	2,185	351	0	35	685	39	972	2,870	647	6	50	100	0	11	1,301
Georgia	18,894	1,312	885	1,353	3,931	1,459	1	12	809	123	2,479	3,178	556	20	19	1,564	17	11	1,166
Total	29,392	1,429	896	2,471	6,116	1,810	1	47	1,494	162	3,451	6,048	1,203	26	69	1,664	17	22	2,467
Central Gulf:																			
Alabama	17,895	1,695	751	1,227	3,546	1,955	0	28	272	378	2,361	2,246	609	37	66	1,189	22	13	1,500
Mississippi	16,653	1,585	822	1,201	3,536	1,598	0	0	166	238	2,138	1,521	401	494	37	764	13	46	2,093
Tennessee	21,641	3,133	1,781	2,494	3,967	2,817	27	460	446	441	840	411	625	279	164	2,112	147	75	1,422
Total	56,189	6,413	3,354	4,922	11,049	6,370	27	488	884	1,057	5,339	4,178	1,635	810	267	4,065	182	134	5,015
West Gulf:																			
Arkansas	21,134	2,432	1,721	2,624	4,976	2,207	0	40	102	199	2,854	919	529	332	46	10	56	37	2,049
Louisiana	18,986	774	402	1,534	3,061	1,965	0	1	194	339	2,972	2,712	1,144	317	3	33	0	15	3,521
Oklahoma	1,701	117	80	331	355	241	0	7	5	0	94	60	66	38	2	0	10	0	296
Texas	7,662	524	361	982	2,011	550	0	2	49	60	1,373	566	272	16	10	0	0	3	884
Total	49,483	3,847	2,564	5,471	10,403	4,963	0	50	350	598	7,293	4,257	2,011	703	61	43	66	55	6,750
Total, South	207,975	20,324	11,259	19,011	39,439	18,094	136	1,031	6,397	3,007	24,346	23,498	6,301	1,727	848	13,804	483	284	17,984
Total, Eastern United States	459,785	46,300	39,537	32,389	66,680	30,913	7,324	25,756	23,871	15,649	26,318	25,506	15,957	16,771	8,502	25,092	2,546	6,905	43,768

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[1] Data may not add to totals because of rounding. Zeros indicate no data or negligible amounts.

TABLE 20.—*Net volume of sawtimber on commercial timberland in the West, by species and section, region, and State, January 1, 1970* [1]

[Million board feet, international ¼-inch log rule]

Section, region, and State	Total all species	Softwoods																Hardwoods				
		Total softwoods	Douglas-fir	Ponderosa and Jeffrey pine	True firs	Western hemlock	Sugar pine	Western white pine	Redwood	Sitka spruce	Engelmann and other spruce	Western larch	Western red-cedar	Incense-cedar	Lodgepole pine	Other western softwoods	Total western hardwoods	Cottonwood and aspen	Red alder	Oak	Other western hardwoods
Pacific Northwest:																					
Alaska: Coastal	179,375	178,102	0	0	358	107,446	0	0	0	59,186	15	0	5,189	0	0	5,908	1,274	1,088	153	0	33
Oregon:																					
Western	350,837	327,862	228,154	4,137	23,616	46,437	4,647	2,931	498	4,736	388	207	6,904	3,335	688	1,184	22,975	577	14,454	984	6,960
Eastern	106,898	106,809	15,431	49,388	22,056	603	364	807	0	0	2,836	4,536	65	562	7,472	2,689	89	83	3	0	3
Summary	457,735	434,671	243,585	53,525	45,672	47,040	5,011	3,738	498	4,736	3,224	4,743	6,969	3,897	8,160	3,873	23,064	660	14,457	984	6,963
Washington:																					
Western	249,377	234,479	86,690	180	35,080	87,751	0	638	0	3,982	164	62	18,750	0	405	777	14,898	853	10,062	0	3,983
Eastern	75,746	75,323	26,441	18,409	11,051	3,388	0	1,614	0	0	2,875	7,616	1,175	1	2,449	304	423	333	5	0	85
Summary	325,123	309,802	113,131	18,589	46,131	91,139	0	2,252	0	3,982	3,039	7,678	19,925	1	2,854	1,081	15,321	1,186	10,067	0	4,068
Total	962,233	922,575	356,716	72,114	92,161	245,625	5,011	5,990	498	67,904	6,278	12,421	32,083	3,898	11,014	10,862	39,659	2,934	24,677	984	11,064
Pacific Southwest:																					
California	277,554	271,653	79,818	51,972	78,367	366	18,503	1,905	23,129	272	29	0	61	10,068	5,170	1,993	5,901	77	165	2,080	3,579
Hawaii	853	18	0	0	0	0	0	0	0	0	0	0	0	0	0	18	835	0	0	0	835
Total	278,407	271,671	79,818	51,972	78,367	366	18,503	1,905	23,129	272	29	0	61	10,068	5,170	2,011	6,736	77	165	2,080	4,414
Total, Pacific Coast	1,240,640	1,194,246	436,534	124,086	170,528	245,991	23,514	7,895	23,627	68,176	6,307	12,421	32,144	13,966	16,184	12,873	46,394	3,011	24,842	3,064	15,478
Northern Rocky Mountain:																					
Idaho [2]	131,666	130,986	37,020	14,154	27,106	3,620	0	11,170	0	0	11,082	7,047	7,611	0	11,548	628	680	526	0	0	154
Montana [2]	102,018	100,926	31,695	10,891	7,047	1,372	0	1,732	0	0	11,590	11,789	1,142	0	22,078	1,590	1,093	1,026	0	0	66
South Dakota (West) [2]	3,444	3,435	0	3,234	0	0	0	0	0	0	201	0	0	0	0	0	9	0	0	0	9
Wyoming [2]	16,365	16,040	1,619	2,571	1,339	0	0	0	0	0	3,792	0	0	0	5,992	727	325	325	0	0	0
Total	253,493	251,387	70,335	30,850	35,492	4,992	0	12,903	0	0	26,666	18,835	8,753	0	39,618	2,944	2,106	1,877	0	0	229
Southern Rocky Mountain:																					
Arizona [2]	21,581	20,903	1,608	16,508	1,079	0	0	0	0	0	1,526	0	0	0	0	182	679	679	0	0	0
Colorado [2]	46,076	42,634	3,948	3,092	5,846	0	0	0	0	0	22,347	0	0	0	6,947	454	3,442	3,436	0	0	7
Nevada [2]	1,344	1,320	0	429	562	28	6	74	0	0	96	0	0	6	77	41	24	24	0	0	0
New Mexico [2]	25,629	24,055	4,968	13,336	2,368	0	0	0	0	0	2,704	0	0	0	0	678	1,574	1,574	0	0	0
Utah [2]	16,285	14,809	3,248	1,596	2,896	0	0	0	0	0	4,404	0	0	0	2,447	218	1,476	1,476	0	0	0
Total	110,916	103,720	13,772	34,961	12,752	28	6	74	0	0	31,077	0	0	6	9,471	1,573	7,196	7,189	0	0	7
Total, Rocky Mountain	364,408	355,106	84,106	65,811	48,244	5,020	6	12,977	0	0	57,742	18,835	8,753	6	49,089	4,517	9,302	9,066	0	0	236
Total, Western United States	1,605,048	1,549,352	520,640	189,897	218,772	251,012	23,520	20,872	23,627	68,176	64,049	31,256	40,897	13,972	65,273	17,390	55,696	12,077	24,842	3,064	15,713

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[1] Data may not add to totals because of rounding. Zeros indicate no data or negligible amounts.

[2] See footnote 2, table 3.

TABLE 21.—*Net annual growth and removals of growing stock on commercial timberland in the United States, by softwoods and hardwoods, ownership and timber supply region, 1952, 1962, and 1970* [1]

[Thousand cubic feet]

SOFTWOOD GROWING STOCK

Growth, removals, and timber supply region	Total, all ownerships			National Forest			Other public			Forest industry			Farm and miscellaneous private		
	1970	1962	1952	1970	1962	1952	1970	1962	1952	1970	1962	1952	1970	1962	1952
NET ANNUAL GROWTH															
Northeast	901,716	821,900	652,600	16,090	15,394	13,282	36,512	31,676	27,166	340,013	237,281	178,928	509,101	537,549	433,224
Northcentral	485,417	421,133	420,920	99,816	89,097	81,818	136,318	117,995	132,405	53,326	48,009	51,409	195,957	166,032	155,288
Total, North	1,387,133	1,243,033	1,073,520	115,906	104,491	95,100	172,830	149,671	159,571	393,339	285,290	230,337	705,058	703,581	588,512
Southeast	2,466,543	2,114,700	1,835,900	114,356	88,800	78,900	105,355	82,900	68,900	509,301	406,700	368,100	1,737,531	1,536,300	1,320,000
Southcentral	2,934,281	2,366,200	1,751,100	284,042	322,000	206,700	76,272	52,300	54,288	897,033	917,700	707,196	1,676,934	1,074,200	782,916
Total, South	5,400,824	4,480,900	3,587,000	398,398	410,800	285,600	181,627	135,200	123,188	1,406,334	1,324,400	1,075,296	3,414,465	2,610,500	2,102,916
PNW Douglas-fir	1,353,000	1,214,000	1,034,000	196,000	197,000	180,000	366,000	316,000	252,000	438,000	393,000	337,000	353,000	308,000	265,000
PNW ponderosa pine	660,500	595,500	497,500	339,900	309,900	260,900	70,000	67,000	65,900	87,000	77,000	62,000	163,600	141,600	108,700
Alaska—Coastal	30,938	26,971	23,005	28,478	24,827	21,176	2,299	2,004	1,709	0	0	0	161	140	120
California and Hawaii	545,000	492,000	444,000	226,000	189,000	162,000	14,000	14,000	14,000	121,000	108,000	90,000	184,000	181,000	178,000
Total, Pacific Coast	2,589,438	2,328,471	1,998,505	790,378	720,727	624,076	452,299	399,004	333,609	646,000	578,000	489,000	700,761	630,740	551,820
Northern Rocky Mountains [2]	1,006,289	964,700	852,700	540,889	554,500	499,800	130,401	115,043	98,608	103,001	90,301	77,467	231,998	204,856	176,825
Southern Rocky Mountains [2]	283,170	280,400	243,000	203,870	213,000	186,800	29,599	24,745	20,007	1,655	1,380	1,170	48,046	41,275	35,023
Total, Rocky Mountains	1,289,459	1,245,100	1,095,700	744,759	767,500	686,600	160,000	139,788	118,615	104,656	91,681	78,637	280,044	246,131	211,848
Total, softwood growth	10,666,854	9,297,504	7,754,725	2,049,441	2,003,518	1,691,376	966,756	823,663	734,983	2,550,329	2,279,371	1,873,270	5,100,328	4,190,952	3,455,096
ANNUAL REMOVALS															
Northeast	434,074	375,400	473,000	2,943	2,708	2,298	9,345	6,200	7,200	139,702	92,814	104,666	282,084	273,651	358,836
Northcentral	194,714	178,220	168,230	29,262	27,913	22,468	44,481	39,910	36,848	29,289	31,085	34,189	91,682	79,312	74,725
Total, North	628,788	553,620	641,230	32,205	30,621	24,766	53,826	46,110	44,048	168,991	123,926	138,855	373,766	352,963	433,561
Southeast	1,799,365	1,568,500	1,835,400	35,241	28,205	14,524	53,357	44,700	52,500	362,489	261,900	324,500	1,348,278	1,233,695	1,443,876
Southcentral	2,196.770	1,211,500	1,276,500	74,717	90,656	45,753	39.235	31,500	42,580	651,635	333,100	493,962	1,431,183	756,244	694,205
Total, South	3,996,135	2,780,000	3,111,900	109,958	118,861	60,277	92,592	76,200	95,080	1,014,124	595,000	818,462	2,779,461	1,989,939	2,138,081
PNW Douglas-fir	2,420,000	1,951,000	1,971,000	530,000	567,000	364,000	359,000	274,000	155,000	1,272,000	909,000	1,150,000	259,000	201,000	302,000
PNW ponderosa pine	586,000	483,000	379,000	314,000	256,000	121,000	103,000	64,000	52,000	120,000	95,000	103,000	49,000	68,000	103,000
Alaska—Coastal	157,090	97,446	17,375	138,978	93,840	16,739	14,051	3,606	636	0	0	0	4,061	0	0
California and Hawaii	901,017	1,001,000	1,120,000	378,000	263,000	117,000	27,000	18,000	5,000	318,000	449,000	456,000	178,017	271,000	542,000
Total, Pacific Coast	4,064,107	3,532,446	3,487,375	1,360,978	1,179,840	618,739	503,051	359,606	212,636	1,710,000	1,453,000	1,709,000	490,078	540,000	947,000
Northern Rocky Mountain [2]	733,399	567,307	407,205	407,329	303,459	146,462	59,167	54,297	61,888	180,317	128,430	98,521	86,586	81,121	100,334
Southern Rocky Mountain [2]	200,916	170,614	125,727	162,081	108,420	81,739	26,435	31,276	17,204	5,475	1,467	416	6,925	29,451	26,368
Total, Rocky Mountain	934,315	737,921	532,932	569,410	411,879	228,201	85,602	85,573	79,092	185,792	129,897	98,937	93,511	110,572	126,702
Total, softwood removals	9,623,345	7,603,987	7,773,437	2,072,551	1,741,201	931,983	735,071	567,489	430,856	3,078,907	2,301,823	2,765,254	3,736,816	2,993,474	3,645,344

See footnotes at end of table.

TABLE 21.—*Net annual growth and removals of growing stock on commercial timberland in the United States, by softwoods and hardwoods, ownership and timber supply region, 1952, 1962, and 1970* [1]—Continued

[Thousand cubic feet]

HARDWOOD GROWING STOCK

Growth, removals, and timber supply region	Total, all ownerships			National Forest			Other public			Forest industry			Farm and miscellaneous private		
	1970	1962	1952	1970	1962	1952	1970	1962	1952	1970	1962	1952	1970	1962	1952
NET ANNUAL GROWTH															
Northeast	1, 972, 900	1, 721, 900	1, 358, 000	104, 727	88, 006	69, 443	210, 056	181, 916	142, 264	195, 971	160, 472	128, 574	1, 462, 146	1, 291, 506	1, 017, 719
Northcentral	2, 180, 568	1, 912, 107	1, 687, 600	181, 085	168, 248	127, 258	332, 983	226, 190	245, 818	121, 382	115, 707	106, 844	1, 545, 118	1, 401, 962	1, 207, 680
Total, North	4, 153, 468	3, 634, 007	3, 045, 600	285, 812	256, 254	196, 701	543, 039	408, 106	388, 082	317, 353	276, 179	235, 418	3, 007, 264	2, 693, 468	2, 225, 399
Southeast	1, 561, 861	1, 385, 000	1, 198, 800	97, 055	81, 100	68, 100	43, 640	30, 500	25, 100	201, 287	164, 900	158, 300	1, 219, 879	1, 108, 500	947, 300
Southcentral	1, 646, 620	1, 588, 500	1, 531, 200	92, 282	95, 500	55, 565	70, 805	61, 100	48, 482	268, 797	264, 400	196, 422	1, 214, 736	1, 167, 500	1, 230, 731
Total, South	3, 208, 481	2, 973, 500	2, 730, 000	189, 337	176, 600	123, 665	114, 445	91, 600	73, 582	470, 084	429, 300	354, 722	2, 434, 615	2, 276, 000	2, 178, 031
PNW Douglas-fir	378, 000	299, 000	219, 000	15, 000	14, 000	13, 000	82, 000	57, 000	33, 000	123, 000	98, 000	75, 000	158, 000	130, 000	98, 000
PNW ponderosa pine	3, 900	3, 800	3, 000	800	800	600	700	700	600	400	400	300	2, 000	1, 900	1, 500
Alaska—Coastal	262	229	195	241	210	179	20	18	15	0	0	0	1	1	1
California and Hawaii	85, 000	80, 000	75, 000	29, 000	30, 000	29, 000	6, 000	5, 000	6, 000	19, 000	15, 000	11, 000	31, 000	30, 000	29, 000
Total, Pacific Coast	467, 162	383, 029	297, 195	45, 041	45, 010	42, 779	88, 720	62, 718	39, 615	142, 400	113, 400	86, 300	191, 001	161, 901	128, 501
Northern Rocky Mountain [2]	12, 678	10, 900	9, 300	2, 978	2, 400	2, 200	2, 653	2, 434	2, 122	798	634	461	6, 249	5, 432	4, 517
Southern Rocky Mountain [2]	59, 004	55, 200	47, 600	34, 904	34, 000	29, 100	4, 323	3, 779	3, 355	294	247	204	19, 483	17, 174	14, 941
Total, Rocky Mountain	71, 682	66, 100	56, 900	37, 882	36, 400	31, 300	6, 976	6, 213	5, 477	1, 092	881	665	25, 732	22, 606	19, 458
Total, hardwood growth	7, 900, 793	7, 056, 636	6, 129, 695	558, 072	514, 264	394, 445	753, 180	568, 637	506, 756	930, 929	819, 760	677, 105	5, 658, 612	5, 153, 975	4, 551, 389
ANNUAL REMOVALS															
Northeast	729, 975	594, 900	504, 200	18, 928	12, 593	6, 856	36, 368	30, 300	23, 700	90, 940	52, 141	46, 791	583, 739	499, 866	426, 853
Northcentral	1, 075, 714	909, 700	947, 600	39, 244	37, 308	26, 003	84, 420	69, 560	47, 887	71, 785	70, 953	76, 706	880, 265	731, 879	797, 004
Total, North	1, 805, 689	1, 504, 600	1, 451, 800	58, 172	49, 901	32, 859	120, 788	99, 860	71, 587	162, 725	123, 094	123, 497	1, 464, 004	1, 231, 745	1, 223, 857
Southeast	1, 059, 074	1, 062, 000	1, 013, 900	25, 697	17, 749	12, 446	19, 963	16, 400	15, 500	161, 884	159, 100	168, 800	851, 530	868, 751	817, 154
Southcentral	1, 427, 758	1, 583, 300	1, 549, 200	9, 727	16, 843	9, 304	43, 217	35, 800	46, 071	219, 001	357, 100	207, 481	1, 155, 813	1, 173, 557	1, 286, 344
Total, South	2, 486, 832	2, 645, 300	2, 563, 100	35, 424	34, 592	21, 750	63, 180	52, 200	61, 571	380, 885	516, 200	376, 281	2, 007, 343	2, 042, 308	2, 103, 498
PNW Douglas-fir	84, 000	57, 000	31, 000	6, 000	1, 000	0	12, 000	3, 000	5, 000	44, 000	24, 000	18, 000	22, 000	29, 000	8, 000
PNW ponderosa pine	2, 070	700	600	1, 100	400	300	100	0	0	0	0	0	870	300	300
Alaska—Coastal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
California and Hawaii	28, 140	20, 500	12, 500	9, 000	7, 000	4, 000	3, 813	2, 197	1, 197	5, 000	4, 000	3, 000	10, 327	7, 303	4, 303
Total, Pacific Coast	114, 210	78, 200	44, 100	16, 100	8, 400	4, 300	15, 913	5, 197	6, 197	49, 000	28, 000	21, 000	33, 197	36, 603	12, 603
Northern Rocky Mountain [2]	78	575	412	49	308	151	6	56	64	12	130	99	11	81	98
Southern Rocky Mountain [2]	2, 654	2, 915	2, 185	2, 202	1, 981	1, 498	130	372	228	57	17	11	265	545	448
Total, Rocky Mountain	2, 732	3, 490	2, 597	2, 251	2, 289	1, 649	136	428	292	69	147	110	276	626	546
Total, hardwood removals	4, 409, 463	4, 231, 590	4, 061, 597	111, 947	95, 182	60, 558	200, 017	157, 685	139, 647	592, 679	667, 441	520, 888	3, 504, 820	3, 311, 282	3, 340, 504

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[1] Zeros indicate no data or negligible amounts.

[2] See footnote 2, table 3.

TABLE 22.—*Net annual growth and removals of sawtimber on commercial timberland in the United States, by softwoods and hardwoods, ownership, and timber supply region, 1952, 1962, 1970* [1]

[Thousand board feet, International ¼-inch log rule]

SOFTWOOD SAWTIMBER

Growth, removals, and timber supply region	Total, all ownerships			National Forest			Other public			Forest industry			Farm and miscellaneous private		
	1970	1962	1952	1970	1962	1952	1970	1962	1952	1970	1962	1952	1970	1962	1952
NET ANNUAL GROWTH															
Northeast	2,094,045	1,597,000	1,412,000	46,690	44,777	39,881	73,916	63,514	59,901	693,239	397,320	334,002	1,280,200	1,091,389	978,216
Northcentral	1,499,900	1,209,760	970,500	261,667	215,563	160,965	418,581	338,016	269,440	175,055	142,635	128,281	644,597	513,546	411,814
Total, North	3,593,945	2,806,760	2,382,500	308,357	260,340	200,846	492,497	401,530	329,341	868,294	539,955	462,283	1,924,797	1,604,935	1,390,030
Southeast	8,229,919	7,194,000	6,536,000	421,733	340,700	314,400	383,417	306,400	249,600	1,701,693	1,364,600	1,303,200	5,723,076	5,182,300	4,668,800
Southcentral	11,865,731	9,474,000	7,102,000	1,376,878	1,435,800	937,200	289,895	186,100	192,500	4,061,479	3,874,800	3,329,300	6,137,479	3,977,300	2,643,000
Total, South	20,095,650	16,668,000	13,638,000	1,798,611	1,776,500	1,251,600	673,312	492,500	442,100	5,763,172	5,239,400	4,632,500	11,860,555	9,159,600	7,311,800
PNW Douglas-fir	6,625,000	6,095,000	5,400,000	1,070,000	1,090,000	1,032,000	1,861,000	1,645,000	1,442,000	2,053,000	1,920 000	1,729,000	1,641,000	1,440,000	1,197,000
PNW ponderosa pine	2,589,900	2,314,900	1,879,000	1,341,700	1,243,700	1,047,700	316,700	290,800	247,700	306,000	262,000	208,000	625,500	518,400	375,600
Alaska—Coastal	163,317	142,790	123,058	150,310	131,419	113,257	12,154	10,626	9,158	0	0	0	853	745	643
California and Hawaii	2,253,000	2,103,000	1,952,000	913,000	805,000	705,000	59,000	58,000	58,000	530,000	474,000	406,000	751,000	766,000	783,000
Total, Pacific Coast	11,631,217	10,655,690	9,354,058	3,475,010	3,270,119	2,897,957	2,248,854	2,004,426	1,756,858	2,889,000	2,656,000	2,343,000	3,018,353	2,725,145	2,356,243
Northern Rocky Mountain [2]	3,724,648	3,560,000	3,284,000	2,034,648	1,987,000	1,853,000	465,698	433,770	392,864	441,041	409,906	373,272	783,261	729,324	664,864
Southern Rocky Mountain [2]	1,211,279	963,000	869,000	982,279	768,000	710,000	89,649	75,054	58,490	3,900	3,318	2,887	135,451	116,628	97,623
Total, Rocky Mountain	4,935,927	4,523,000	4,153,000	3,016,927	2,755,000	2,563,000	555,347	508,824	451,354	444,941	413,224	376,159	918,712	845,952	762,487
Total, softwood growth	40,256,739	34,653,450	29,527,558	8,598,905	8,061,959	6,913,403	3,970,010	3,407,280	2,979,653	9,965,407	8,848,579	7,813,942	17,722,417	14,335,632	11,820,560
ANNUAL REMOVALS															
Northeast	1,441,319	946,000	1,333,000	11,674	12,530	11,662	29,268	15,254	18,449	452,011	221,145	281,143	948,366	697,071	1,021,746
Northcentral	660,376	551,500	532,300	105,412	100,803	80,482	139,992	100,941	90,337	118,665	107,130	125,298	296,307	242,626	236,183
Total, North	2,101,695	1,497,500	1,865,300	117,086	113,333	92,144	169,260	116,195	108,786	570,676	328,275	406,441	1,244,673	939,697	1,257,929
Southeast	5,833,570	5,295,200	6,722,000	142,265	112,203	57,180	190,214	162,100	198,200	1,239,551	961,700	1,267,700	4,261,540	4,059,197	5,198,920
Southcentral	9,212,042	4,550,000	5,159,000	330,778	388,894	206,585	135,669	118,800	156,300	3,087,106	1,440,900	2,309,700	5,658,489	2,601,406	2,486,415
Total, South	15,045,612	9,845,200	11,881,000	473,043	501,097	263,765	325,883	280,900	354,500	4,326,657	2,402,600	3,577,400	9,920,029	6,660,603	7,685,335
PNW Douglas-fir	15,084,000	12,479,000	12,909,000	3,450,000	3,726,000	2,419,000	2,400,000	1,833,000	1,075,000	7,830,000	5,839,000	7,666,000	1,404,000	1,081,000	1,749,000
PNW ponderosa pine	3,491,000	2,937,000	2,332,000	1,924,000	1,602,000	768,000	605,000	382,000	312,000	693,000	563,000	632,000	269,000	390,000	620,000
Alaska—Coastal	1,079,585	617,433	108,526	984,337	594,588	104,511	73,882	22,845	4,015	0	0	0	21,366	0	0
California and Hawaii	5,581,119	6,046,000	6,941,000	2,532,000	1,657,000	815,000	172,000	112,000	33,000	1,822,000	2,619,000	2,687,000	1,055,119	1,658,000	3,406,000
Total, Pacific Coast	25,235,704	22,079,433	22,290,526	8,890,337	7,579,588	4,106,511	3,250,882	2,349,845	1,424,015	10,345,000	9,021,000	10,985,000	2,749,485	3,129,000	5,775,000
Northern Rocky Mountain	4,202,868	3,317,657	2,423,019	2,334,091	1,745,076	846,095	341,568	333,259	381,084	1,030,648	769,314	618,013	496,561	470,008	577,827
Southern Rocky Mountain	1,152,890	961,230	753,455	925,377	676,498	525,480	156,484	147,758	80,062	32,300	8,376	2,349	38,729	128,598	145,564
Total, Rocky Mountain	5,355,758	4,278,887	3,176,474	3,259,468	2,421,574	1,371,575	498,052	481,017	461,146	1,062,948	777,690	620,362	535,290	598,606	723,391
Total, softwood removals	47,738,769	37,701,020	39,213,300	12,739,934	10,615,592	5,833,995	4,244,077	3,227,957	2,348,447	16,305,281	12,529,565	15,589,203	14,449,477	11,327,906	15,441,655

See footnotes at end of table.

TABLE 22.—*Net annual growth and removals of sawtimber on commercial timberland in the United States, by softwoods and hardwoods, ownership, and timber supply region, 1952, 1962, 1970* [1]—Continued

[Thousand board feet, International ¼-inch log rule]

HARDWOOD SAWTIMBER

Growth, removals, and timber supply region	Total, all ownerships			National Forest			Other public			Forest industry			Farm and miscellaneous private		
	1970	1962	1952	1970	1962	1952	1970	1962	1952	1970	1962	1952	1970	1962	1952
NET ANNUAL GROWTH															
Northeast	3,988,947	3,275,000	2,640,000	209,119	172,333	135,932	344,144	288,296	224,275	426,664	276,495	235,573	3,009,020	2,537,876	2,044,220
Northcentral	6,086,900	5,370,320	4,337,100	409,775	352,300	233,811	734,453	600,463	441,572	331,139	290,458	253,896	4,611,533	4,127,099	3,407,821
Total, North	10,075,847	8,645,320	6,977,100	618,894	524,633	369,743	1,078,597	888,759	665,847	757,803	566,953	489,469	7,620,553	6,664,975	5,452,041
Southeast	3,865,582	3,590,000	3,353,000	223,575	194,700	167,400	106,672	72,400	63,600	486,597	423,300	443,700	3,048,738	2,899,600	2,678,300
Southcentral	4,066,736	4,035,000	4,239,000	198,156	245,400	145,400	209,448	184,800	140,200	720,240	636,000	523,900	2,938,892	2,968,800	3,429,500
Total, South	7,932,318	7,625,000	7,592,000	421,731	440,100	312,800	316,120	257,200	203,800	1,206,837	1,059,300	967,600	5,987,630	5,868,400	6,107,800
PNW Douglas-fir	1,329,000	1,070,000	758,000	91,000	89,000	68,000	248,000	193,000	126,000	402,000	311,000	210,000	588,000	477,000	354,000
PNW ponderosa pine	10,200	10,000	8,300	3,100	3,000	2,600	4,200	4,000	3,400	1,000	1,000	800	1,900	2,000	1,500
Alaska—Coastal	1,384	1,210	1,042	1,269	1,110	956	107	94	81	0	0	0	8	6	5
California and Hawaii	169,000	161,000	156,000	47,000	49,000	50,000	10,000	10,000	12,000	38,000	30,000	24,000	74,000	72,000	70,000
Total, Pacific Coast	1,509,584	1,242,210	923,342	142,369	142,110	121,556	262,307	207,094	141,481	441,000	342,000	234,800	663,908	551,006	425,505
Northern Rocky Mountain [2]	29,837	27,000	26,000	4,837	3,000	3,000	8,148	7,595	7,050	2,859	2,674	2,489	13,993	13,731	13,461
Southern Rocky Mountain [2]	114,800	80,000	72,000	83,800	52,000	46,000	3,404	2,983	2,944	531	482	434	27,065	24,535	22,622
Total, Rocky Mountain	144,637	107,000	98,000	88,637	55,000	49,000	11,552	10,578	9,994	3,390	3,156	2,923	41,058	38,266	36,083
Total, Hardwood Growth	19,662,386	17,619,530	15,590,442	1,271,631	1,161,843	853,099	1,668,576	1,363,631	1,021,122	2,409,030	1,971,409	1,694,792	14,313,149	13,122,647	12,021,429
ANNUAL REMOVALS															
Northeast	2,591,240	1,566,000	1,459,000	76,402	51,200	28,022	127,303	73,303	60,605	294,212	119,898	113,682	2,093,323	1,321,599	1,256,691
Northcentral	4,257,053	3,388,300	3,373,900	133,454	127,620	86,522	212,589	165,996	107,757	248,363	228,491	230,061	3,662,647	2,866,193	2,949,560
Total, North	6,848,293	4,954,300	4,832,900	209,856	178,820	114,544	339,892	239,299	168,362	542,575	348,389	343,743	5,755,970	4,187,792	4,206,251
Southeast	2,941,875	3,085,300	3,287,300	110,133	89,564	61,868	48,306	36,900	38,800	451,672	478,800	559,900	2,331,764	2,480,036	2,626,732
Southcentral	4,852,656	4,261,000	4,982,000	46,693	81,409	45,193	146,438	94,300	158,900	748,676	899,700	636,000	3,910,849	3,185,591	4,141,907
Total, South	7,794,531	7,346,300	8,269,300	156,826	170,973	107,061	194,744	131,200	197,700	1,200,348	1,378,500	1,195,900	6,242,613	5,665,627	6,768,639
PNW Douglas-fir	301,000	207,000	122,000	24,000	4,000	0	41,000	8,000	22,000	156,000	89,000	73,000	80,000	106,000	27,000
PNW ponderosa pine	8,440	2,900	2,200	4,500	1,500	1,200	400	100	100	0	0	0	3,540	1,300	900
Alaska—Coastal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
California and Hawaii	66,693	39,000	24,000	20,000	13,000	7,000	13,064	4,185	3,185	12,000	7,000	4,000	21,629	14,815	9,815
Total, Pacific Coast	376,133	248,900	148,200	48,500	18,500	8,200	54,464	12,285	25,285	168,000	96,000	77,000	105,169	122,115	37,715
Northern Rocky Mountain	461	3,410	2,489	284	1,776	865	33	353	399	79	800	643	65	481	582
Southern Rocky Mountain	11,890	16,365	13,140	10,273	12,178	9,476	621	1,670	1,164	333	92	65	663	2,425	2,435
Total, Rocky Mountain	12,351	19,775	15,629	10,557	13,954	10,341	654	2,023	1,563	412	892	708	728	2,906	3,017
Total, hardwood removals	15,031,308	12,569,275	13,266,029	425,739	382,247	240,146	589,754	384,807	392,910	1,911,335	1,823,781	1,617,351	12,104,480	9,978,440	11,015,655

[1] Zeros indicate no data or negligible amounts.

[2] See footnote 2, table 3.

TABLE 23.—*Net annual growth and removals of softwood growing stock and sawtimber on commercial timberland in the United States, by species and timber supply region, 1970* [1]

EASTERN SOFTWOOD GROWING STOCK—THOUSAND CUBIC FEET

Eastern supply region	Total		Southern yellow pines		Eastern white and red pines		Spruce and balsam fir		Ponderosa pine		Other eastern softwoods	
	Growth	Removals	Growth	Removals	Growth	Removals	Growth	Removals	Growth	Removals	Growth	Removals
Northeast	901,716	434,074	60,164	49,039	201,525	126,355	478,978	161,470	0	0	161,049	97,210
Northcentral	485,417	194,714	41,941	25,128	95,714	19,476	147,273	53,339	4,376	1,665	196,113	95,106
Total, North	1,387,133	628,788	102,105	74,167	297,239	145,831	626,251	214,809	4,376	1,665	357,162	192,316
Southeast	2,466,543	1,799,365	2,334,412	1,722,937	25,776	11,792	209	0	0	0	106,146	64,636
Southcentral	2,934,281	2,196,770	2,791,452	2,157,080	5,300	2,800	0	0	0	0	137,529	36,890
Total, South	5,400,824	3,996,135	5,125,864	3,880,017	31,076	14,592	209	0	0	0	243,675	101,526
Total, Eastern growing stock	6,787,957	4,624,923	5,227,969	3,954,184	328,315	160,423	626,460	214,809	4,376	1,665	600,837	293,842

EASTERN SOFTWOOD SAWTIMBER—THOUSAND BOARD FEET, INTERNATIONAL ¼-INCH LOG RULE

Eastern supply region	Total		Southern yellow pines		Eastern white and red pines		Spruce and balsam fir		Ponderosa pine		Other eastern softwoods	
	Growth	Removals	Growth	Removals	Growth	Removals	Growth	Removals	Growth	Removals	Growth	Removals
Northeast	2,094,045	1,441,319	141,715	174,398	603,860	508,412	929,219	457,774	0	0	419,251	300,735
Northcentral	1,499,900	660,376	171,746	65,091	436,420	115,608	348,545	170,322	23,989	3,855	519,200	305,500
Total, North	3,593,945	2,101,695	313,461	239,489	1,040,280	624,020	1,277,764	628,096	23,989	3,855	938,451	606,235
Southeast	8,229,919	5,833,570	7,752,353	5,540,069	107,973	55,194	1,393	0	0	0	368,200	238,307
Southcentral	11,865,731	9,212,042	11,267,100	9,018,985	24,200	13,500	0	0	0	0	574,431	179,557
Total, South	20,095,650	15,045,612	19,019,453	14,559,054	132,173	68,694	1,393	0	0	0	942,631	417,864
Total, Eastern sawtimber	23,689,595	17,147,307	19,332,914	14,798,543	1,172,453	692,714	1,279,157	628,096	23,989	3,855	1,881,082	1,024,099

WESTERN SOFTWOOD GROWING STOCK—THOUSAND CUBIC FEET

Western supply region	Total		Douglas-fir		Ponderosa and Jeffrey pines		Western white and sugar pines		Western hemlock		True firs		Other western softwoods	
	Growth	Removals	Growth	Removals	Growth	Removals	Growth	Removals	Growth	Removals	Growth	Removals	Growth	Removals
PNW Douglas-fir	1,353,000	2,420,000	771,900	1,356,600	7,700	18,900	6,100	14,900	353,600	648,800	77,600	149,200	136,100	231,600
PNW ponderosa pine	660,500	586,000	175,500	120,400	213,300	334,300	2,600	3,400	6,300	7,300	100,800	58,300	162,000	62,300
Alaska—Coastal	30,938	157,090	0	0	0	0	0	0	18,832	92,369	58	0	12,048	64,721
California and Hawaii	545,000	901,017	156,400	290,600	91,700	141,800	35,800	72,200	1,000	1,100	138,100	202,100	122,000	193,217
Total, Pacific Coast	2,589,438	4,064,107	1,103,800	1,767,600	312,700	495,000	44,500	90,500	379,732	749,569	316,558	409,600	432,148	551,838
Northern Rocky Mountain [2]	1,006,289	733,399	248,541	150,363	144,520	129,237	9,106	77,506	20,370	7,651	162,704	99,449	421,048	269,193
Southern Rocky Mountain [2]	283,170	200,916	23,578	20,162	114,627	113,998	−12	0	31	0	29,136	10,018	115,810	56,738
Total, Rocky Mountain	1,289,459	934,315	272,119	170,525	259,147	243,235	9,094	77,506	20,401	7,651	191,840	109,467	536,858	325,931
Total, Western growing stock	3,878,897	4,998,422	1,375,919	1,938,125	571,847	738,235	53,594	168,006	400,133	757,220	508,398	519,067	969,006	877,769

WESTERN SOFTWOOD SAWTIMBER—THOUSAND BOARD FEET, INTERNATIONAL 1/4-INCH LOG RULE

Western supply region	Total		Douglas-fir		Ponderosa and Jeffrey pines		Western white and sugar pines		Western hemlock		True firs		Other western softwoods	
	Growth	Removals	Growth	Removals	Growth	Removals	Growth	Removals	Growth	Removals	Growth	Removals	Growth	Removals
PNW Douglas-fir	6,625,000	15,084,000	3,913,900	8,542,600	30,000	119,400	26,600	95,100	1,663,400	3,985,500	346,000	919,800	645,100	1,421,600
PNW ponderosa pine	2,589,900	3,491,000	655,000	720,400	895,700	1,990,800	16,200	20,300	25,700	43,400	377,600	345,500	619,700	370,600
Alaska—Coastal	163,317	1,079,585	0	0	0	0	0	0	98,527	634,796	329	0	64,461	444,789
California and Hawaii	2,253,000	5,581,119	637,100	1,799,800	345,600	878,500	134,300	447,100	4,800	7,300	524,900	1,251,200	686,300	1,197,219
Total, Pacific Coast	11,631,217	25,235,704	5,206,000	11,062,800	1,271,300	2,988,700	177,100	562,500	1,792,427	4,670,996	1,248,829	2,516,500	1,935,561	3,434,208
Northern Rocky Mountain [2]	3,724,648	4,202,868	1,033,981	862,349	631,065	739,276	17,594	456,820	78,128	43,102	649,665	583,070	1,314,215	1,518,251
Southern Rocky Mountain [2]	1,211,279	1,152,890	91,907	119,573	453,546	644,085	562	3	172	0	134,460	59,264	530,632	329,965
Total, Rocky Mountain	4,935,927	5,355,758	1,125,888	981,922	1,084,611	1,383,361	18,156	456,823	78,300	43,102	784,125	642,334	1,844,847	1,848,216
Total, Western sawtimber	16,567,144	30,591,462	6,331,888	12,044,722	2,355,911	4,372,061	195,256	1,019,323	1,870,727	4,714,098	2,032,954	3,158,834	3,780,408	5,282,424

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[1] Zeros indicate no data or negligible amounts.

[2] See footnote 2, table 3.

TABLE 24.—*Net annual growth and removals of hardwood growing stock and sawtimber on commercial timberland in the United States, by species and timber supply region 1970* [1]

GROWING STOCK—THOUSAND CUBIC FEET

Timber supply region	Total		Select white and red oaks		Other white and red oaks		Hickory		Yellow birch		Hard maple		Sweetgum		Ash, walnut, and black cherry		Yellow-poplar		Other hardwoods	
	Growth	Removals	Growth	Removals	Growth	Removals	Growth	Removals	Growth	Removals	Growth	Removals	Growth	Removals	Growth	Removals	Growth	Removals	Growth	Removals
Northeast	1, 972, 900	729, 975	395, 705	148, 502	283, 462	94, 993	68, 198	20, 222	42, 397	45, 440	191, 092	90, 590	14, 934	3, 108	188, 819	73, 075	112, 478	45, 332	675, 815	208, 713
Northcentral	2, 180, 568	1, 075, 714	323, 578	235, 757	267, 104	139, 329	109, 922	32, 447	15, 282	11, 068	184, 919	65, 369	12, 653	5, 071	155, 634	54, 656	72, 653	23, 545	1, 038, 823	508, 472
Total, North	4, 153, 468	1, 805, 689	719, 283	384, 259	550, 566	234, 322	178, 120	52, 669	57, 679	56, 508	376, 011	155, 959	27, 587	8, 179	344, 453	127, 731	185, 131	68, 877	1, 714, 638	717, 185
Southeast	1, 561, 861	1, 059, 074	222, 658	158, 255	412, 851	243, 559	69, 532	37, 799	4, 414	273	5, 566	2, 639	210, 248	165, 818	44, 466	29, 680	202, 736	127, 155	389, 390	293, 896
Southcentral	1, 646, 620	1, 427, 758	252, 490	165, 164	547, 985	467, 853	173, 524	137, 713	200	100	11, 233	4, 197	189, 179	224, 871	71, 131	50, 883	53, 340	38, 091	347, 538	338, 886
Total, South	3, 208, 481	2, 486, 832	475, 148	323, 419	960, 836	711, 412	243, 056	175, 512	4, 614	373	16, 799	6, 836	399, 427	390, 689	115, 597	80, 563	256, 076	165, 246	736, 928	632, 782
PNW Douglas-fir	378, 000	84, 000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	378, 000	84, 000
PNW ponderosa pine	3, 900	2, 070	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3, 900	2, 070
Alaska—Coastal	262	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	262	0
California and Hawaii	85, 000	28, 140	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	85, 000	28, 140
Total, Pacific Coast	467, 162	114, 210	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	467, 162	114, 210
Northern Rocky Mountain	12, 678	78	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12, 678	78
Southern Rocky Mountain	59, 004	2, 654	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59, 004	2, 654
Total, Rocky Mountain	71, 682	2, 732	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	71, 682	2, 732
Total growing stock	7, 900, 793	4, 409, 463	1, 194, 431	707, 678	1, 511, 402	945, 734	421, 176	228, 181	62, 293	56, 881	392, 810	162, 795	427, 014	398, 868	460, 050	208, 294	441, 207	234, 123	2, 990, 410	1, 466, 909

SAWTIMBER—THOUSAND BOARD FEET, INTERNATIONAL ¼-INCH LOG RULE

Timber supply region	Total		Select white and red oaks		Other white and red oaks		Hickory		Yellow birch		Hard maple		Sweetgum		Ash, walnut, and black cherry		Yellow-poplar		Other hardwoods	
	Growth	Removals	Growth	Removals	Growth	Removals	Growth	Removals	Growth	Removals	Growth	Removals	Growth	Removals	Growth	Removals	Growth	Removals	Growth	Removals
Northeast	3, 988, 947	2, 591, 240	898, 907	578, 168	551, 139	333, 271	119, 671	73, 713	89, 020	166, 366	399, 520	30, 789	30, 917	6, 064	362, 207	170, 570	291, 264	209, 790	1, 240, 302	722, 509
Northcentral	6, 086, 900	4, 257, 053	1, 195, 556	1, 051, 849	875, 907	633, 276	290, 507	111, 111	53, 757	56, 645	450, 719	305, 811	50, 589	29, 222	378, 922	245, 006	273, 083	151, 983	2, 517, 860	1, 672, 150
Total, North	10, 075, 847	6, 848, 293	2, 094, 463	1, 630, 017	1, 427, 046	966, 547	410, 178	184, 824	142, 777	223, 011	850, 239	636, 600	81, 506	35, 286	741, 129	415, 576	564, 347	361, 773	3, 764, 162	2, 394, 659
Southeast	3, 865, 582	2, 941, 875	581, 404	422, 735	1, 012, 696	642, 032	187, 648	109, 559	4, 989	1, 088	12, 598	9, 700	487, 114	490, 068	106, 600	72, 950	548, 378	384, 161	924, 155	809, 582
Southcentral	4, 066, 736	4, 852, 656	659, 896	653, 710	1, 293, 346	1, 504, 284	441, 292	431, 395	700	500	26, 584	16, 318	422, 110	734, 515	164, 346	167, 496	181, 473	163, 089	876, 989	1, 181, 349
Total, South	7, 932, 318	7, 794, 531	1, 241, 300	1, 076, 445	2, 306, 042	2, 146, 316	628, 940	540, 954	5, 689	1, 588	39, 182	26, 018	909, 224	1, 224, 583	270, 946	240, 446	729, 851	547, 250	1, 801, 144	1, 990, 931
PNW Douglas-fir	1, 329, 000	301, 000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1, 329, 000	301, 000
PNW ponderosa pine	10, 200	8, 440	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10, 200	8, 440
Alaska—Coastal	1, 384	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1, 384	0
California and Hawaii	169, 000	66, 693	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	169, 000	66, 693
Total, Pacific Coast	1, 509, 584	376, 133	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1, 509, 584	376, 133
Northern Rocky Mountain	29, 837	461	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29, 837	461
Southern Rocky Mountain	114, 800	11, 890	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	114, 800	11, 890
Total, Rocky Mountain	144, 637	12, 351	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	144, 637	12, 351
Total sawtimber	19, 662, 386	15, 031, 308	3, 335, 763	2, 706, 462	3, 733, 088	3, 112, 863	1, 039, 118	725, 778	148, 466	224, 599	889, 421	662, 618	990, 730	1, 259, 869	1, 012, 075	656, 022	1, 294, 198	909, 023	7, 219, 527	4, 774, 074

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[1] Zeroes indicate no data or negligible amounts

TABLE 25.—*Net annual growth and removals of growing stock on commercial timberland in the United States, by softwoods and hardwoods and section, region, and State, 1970* [1]

[Thousand cubic feet]

Section, region, and State	All species		Softwoods		Hardwoods	
	Growth	Removals	Growth	Removals	Growth	Removals
New England:						
Connecticut	45, 362	8, 553	6, 110	1, 310	39, 252	7, 243
Maine	710, 800	408, 700	550, 000	275, 200	160, 800	133, 500
Massachusetts	80, 999	31, 329	22, 585	14, 709	58, 414	16, 620
New Hampshire	138, 136	60, 490	85, 818	24, 635	52, 318	35, 855
Rhode Island	9, 758	2, 376	889	493	8, 869	1, 883
Vermont	92, 850	50, 995	45, 416	22, 043	47, 434	28, 952
Total	1, 077, 905	562, 443	710, 818	338, 390	367, 087	224, 053
Middle Atlantic:						
Delaware	30, 959	11, 858	8, 076	8, 337	22, 883	3, 521
Maryland	106, 499	75, 572	16, 576	30, 774	89, 923	44, 798
New Jersey	56, 911	12, 301	16, 082	5, 501	40, 829	6, 800
New York	285, 857	114, 904	80, 247	21, 983	205, 610	92, 921
Pennsylvania	762, 820	231, 755	44, 375	16, 443	718, 445	215, 312
West Virginia	553, 665	155, 216	25, 542	12, 646	528, 123	142, 570
Total	1, 796, 711	601, 606	190, 898	95, 684	1, 605, 813	505, 922
Lake States:						
Michigan	605, 111	213, 078	176, 878	54, 770	428, 233	158, 308
Minnesota	455, 635	155, 198	114, 881	70, 227	340, 754	84, 971
North Dakota	4, 973	3, 136	0	0	4, 973	3, 136
South Dakota (East)	4, 158	1, 859	928	409	3, 230	1, 450
Wisconsin	503, 637	308, 983	133, 039	39, 185	370, 598	269, 798
Total	1, 573, 514	682, 254	425, 726	164, 591	1, 147, 788	517, 663
Central:						
Illinois	92, 502	91, 096	1, 388	1, 009	91, 114	90, 087
Indiana	106, 525	65, 692	3, 886	484	102, 639	65, 208
Iowa	81, 181	50, 405	230	318	80, 951	50, 087
Kansas	16, 002	7, 616	23	20	15, 979	7, 596
Kentucky	319, 214	141, 254	21, 222	11, 067	297, 992	130, 187
Missouri	302, 683	108, 835	24, 096	14, 086	278, 587	94, 749
Nebraska	16, 718	10, 156	3, 831	1, 256	12, 887	8, 900
Ohio	157, 646	113, 120	5, 015	1, 883	152, 631	111, 237
Total	1, 092, 471	588, 174	59, 691	30, 123	1, 032, 780	558, 051
Total, North	5, 540, 601	2, 434, 477	1, 387, 133	628, 788	4, 153, 468	1, 805, 689
South Atlantic:						
North Carolina	885, 140	690, 716	449, 010	376, 816	436, 130	313, 900
South Carolina	691, 354	448, 977	440, 372	298, 758	250, 982	150, 219
Virginia	563, 478	442, 907	168, 518	165, 956	394, 960	276, 951
Total	2, 139, 972	1, 582, 600	1, 057, 900	841, 530	1, 082, 072	741, 070
East Gulf:						
Florida	531, 800	347, 900	415, 500	278, 300	116, 300	69, 600
Georgia	1, 356, 632	927, 939	993, 143	679, 535	363, 489	248, 404
Total	1, 888, 432	1, 275, 839	1, 408, 643	957, 835	479, 789	318, 004
Central Gulf:						
Alabama	947, 149	807, 183	718, 691	521, 487	228, 458	285, 696
Mississippi	966, 261	745, 962	591, 665	461, 870	374, 596	284, 092
Tennessee	509, 100	216, 400	102, 900	33, 200	406, 200	183, 200
Total	2, 422, 510	1, 769, 545	1, 413, 256	1, 016, 557	1, 009, 254	752, 988
West Gulf:						
Arkansas	778, 511	620, 108	402, 972	299, 414	375, 539	320, 694
Louisiana	743, 842	721, 637	604, 804	522, 901	139, 038	198, 736
Oklahoma	70, 066	52, 076	48, 421	22, 532	21, 645	29, 544
Texas	565, 972	461, 162	464, 828	335, 366	101, 144	125, 796
Total	2, 158, 391	1, 854, 983	1, 521, 025	1, 180, 213	637, 366	674, 770
Total, South	8, 609, 305	6, 482, 967	5, 400, 824	3, 996, 135	3, 208, 481	2, 486, 832
Pacific Northwest:						
Alaska: Coastal	31, 200	157, 090	30, 938	157, 090	262	0
Oregon:						
Western	786, 000	1, 204, 000	633, 000	1, 183, 000	153, 000	21, 000
Eastern	365, 000	352, 000	364, 500	352, 000	500	0
Summary	1, 151, 000	1, 556, 000	997, 500	1, 535, 000	153, 500	21, 000

See footnotes at end of table.

TABLE 25.—*Net annual growth and removals of growing stock on commercial timberland in the United States, by softwoods and hardwoods and section, region, and State, 1970*[1]—Continued

[Thousand cubic feet]

Section, region, and State	All species		Softwoods		Hardwoods	
	Growth	Removals	Growth	Removals	Growth	Removals
Pacific Northwest—Continued						
Washington:						
Western	945,000	1,300,000	720,000	1,237,000	225,000	63,000
Eastern	299,400	236,070	296,000	234,000	3,400	2,070
Summary	1,244,400	1,536,070	1,016,000	1,471,000	228,400	65,070
Total	2,426,600	3,249,160	2,044,438	3,163,090	382,162	86,070
Pacific Southwest:						
California	630,000	927,000	545,000	901,000	85,000	26,000
Hawaii	[2] 0	2,157	[2] 0	17	[2] 0	2,140
Total	630,000	929,157	545,000	901,017	85,000	28,140
Total, Pacific Coast	3,056,600	4,178,317	2,589,438	4,064,107	467,162	114,210
Northern Rocky Mountain:						
Idaho [3]	502,963	357,256	496,981	357,210	5,982	46
Montana [3]	443,141	324,411	439,644	324,379	3,497	32
South Dakota (West) [3]	27,110	15,655	26,910	15,655	200	0
Wyoming [3]	45,753	36,155	42,754	36,155	2,999	0
Total	1,018,967	733,477	1,006,289	733,399	12,678	78
Southern Rocky Mountain:						
Arizona [3]	71,275	87,741	66,239	87,557	5,036	184
Colorado [3]	157,338	58,993	123,393	57,489	33,945	1,504
Nevada [3]	2,293	10	2,052	10	241	0
New Mexico [3]	75,061	44,086	65,888	43,600	9,173	486
Utah [3]	36,207	12,740	25,598	12,260	10,609	480
Total	342,174	203,570	283,170	200,916	59,004	2,654
Total, Rocky Mountain	1,361,141	937,047	1,289,459	934,315	71,682	2,732
Total, all regions	18,567,647	14,032,808	10,666,854	9,623,345	7,900,793	4,409,463

[1] Zeros indicate no data or negligible amounts.

[2] Growth estimate for Hawaii is not available.

[3] See footnote 2, table 3.

TABLE 26.—*Net annual growth and removals of sawtimber on commercial timberland in the United States, by softwoods and hardwoods and section, region, and State, 1970*[1]

[Thousand board feet]

Section, region, and State	All species		Softwoods		Hardwoods	
	Growth	Removals	Growth	Removals	Growth	Removals
New England:						
Connecticut	81,519	28,293	12,611	3,687	68,908	24,606
Maine	1,622,000	1,299,000	1,224,000	878,000	398,000	421,000
Massachusetts	111,740	128,219	47,192	59,859	64,548	68,360
New Hampshire	304,892	219,676	230,885	98,995	74,007	120,681
Rhode Island	7,686	6,400	1,395	1,209	6,291	5,191
Vermont	162,727	162,972	94,828	69,648	67,899	93,324
Total	2,290,564	1,844,560	1,610,911	1,111,398	679,653	733,162
Middle Atlantic:						
Delaware	62,641	32,984	20,456	21,503	42,185	11,481
Maryland	268,053	320,585	43,019	126,837	225,034	193,748
New Jersey	141,337	37,059	37,168	11,569	104,169	25,490
New York	702,595	415,915	213,213	66,391	489,382	349,524
Pennsylvania	1,274,604	718,630	96,087	52,619	1,178,517	666,011
West Virginia	1,343,198	662,826	73,191	51,002	1,270,007	611,824
Total	3,792,428	2,187,999	483,134	329,921	3,309,294	1,858,078
Lake States:						
Michigan	1,588,533	867,017	545,975	206,816	1,042,558	660,201
Minnesota	1,057,665	485,168	353,554	242,855	704,111	242,313
North Dakota	18,390	6,785	0	0	18,390	6,785
South Dakota (East)	15,719	4,623	3,459	770	12,260	3,853
Wisconsin	1,348,068	795,824	380,547	127,470	967,521	668,354
Total	4,028,375	2,159,417	1,283,535	577,911	2,744,840	1,581,506
Central:						
Illinois	288,587	396,942	1,800	1,983	286,787	394,959
Indiana	288,416	350,851	8,176	1,030	280,240	349,821
Iowa	338,274	162,530	805	864	337,469	161,666

See footnotes at end of table.

TABLE 26.—*Net annual growth and removals of sawtimber on commercial timberland in the United States, by softwoods and hardwoods and section, region, and State, 1970* [1]—Continued

[Thousand board feet]

Section, region, and State	All species		Softwoods		Hardwoods	
	Growth	Removals	Growth	Removals	Growth	Removals
Central—Continued						
Kansas	48,199	35,691	0	0	48,199	35,691
Kentucky	1,198,381	728,089	75,768	39,846	1,122,613	688,243
Missouri	832,103	460,450	91,249	30,168	740,854	430,282
Nebraska	80,491	51,630	21,214	3,085	59,277	48,545
Ohio	483,974	571,829	17,353	5,489	466,621	566,340
Total	3,558,425	2,758,012	216,365	82,465	3,342,060	2,675,547
Total, North	13,669,792	8,949,988	3,593,945	2,101,695	10,075,847	6,848,293
South Atlantic:						
North Carolina	2,718,217	2,028,851	1,668,692	1,208,834	1,049,525	820,017
South Carolina	2,126,688	1,513,088	1,486,581	999,446	640,107	513,642
Virginia	1,511,156	1,187,050	542,584	486,952	968,572	700,098
Total	6,356,061	4,728,989	3,697,857	2,695,232	2,658,204	2,033,757
East Gulf:						
Florida	1,687,500	1,153,700	1,322,500	934,000	365,000	219,700
Georgia	4,051,940	2,892,756	3,209,562	2,204,338	842,378	688,418
Total	5,739,440	4,046,456	4,532,062	3,138,338	1,207,378	908,118
Central Gulf:						
Alabama	3,073,164	2,900,450	2,547,610	2,028,440	525,554	872,010
Mississippi	3,228,384	2,756,830	2,346,722	1,825,233	881,662	931,597
Tennessee	1,428,200	819,600	309,000	124,000	1,119,200	695,600
Total	7,729,748	6,476,880	5,203,332	3,977,673	2,526,416	2,499,207
West Gulf:						
Arkansas	2,603,740	2,537,270	1,713,949	1,375,816	889,791	1,161,454
Louisiana	3,153,495	3,024,281	2,737,600	2,350,655	415,895	673,626
Oklahoma	191,965	188,834	156,684	101,840	35,281	86,994
Texas	2,253,519	1,837,433	2,054,166	1,406,058	199,353	431,375
Total	8,202,719	7,587,818	6,662,399	5,234,369	1,540,320	2,353,449
Total, South	28,027,968	22,840,143	20,095,650	15,045,612	7,932,318	7,794,531
Pacific Northwest:						
Alaska: Coastal	164,701	1,079,585	163,317	1,079,585	1,384	0
Oregon:						
Western	3,628,000	7,678,000	3,035,000	7,591,000	593,000	87,000
Eastern	1,367,000	2,098,000	1,365,900	2,098,000	1,100	0
Summary	4,995,000	9,776,000	4,400,900	9,689,000	594,100	87,000
Washington:						
Western	4,326,000	7,707,000	3,590,000	7,493,000	736,000	214,000
Eastern	1,233,100	1,401,440	1,224,000	1,393,000	9,100	8,440
Summary	5,559,100	9,108,440	4,814,000	8,886,000	745,100	222,440
Total	10,718,801	19,964,025	9,378,217	19,654,585	1,340,584	309,440
Pacific Southwest:						
California	2,422,000	5,637,000	2,253,000	5,581,000	169,000	56,000
Hawaii	[2] 0	10,812	[2] 0	119	[2] 0	10,693
Total	2,422,000	5,647,812	2,253,000	5,581,119	169,000	66,693
Total, Pacific Coast	13,140,801	25,611,837	11,631,217	25,235,704	1,509,584	376,133
Northern Rocky Mountain:						
Idaho [3]	2,005,146	2,105,695	1,992,087	2,105,424	13,059	271
Montana [3]	1,486,242	1,814,856	1,473,401	1,814,666	12,841	190
South Dakota (West) [3]	98,815	87,091	98,815	87,091	0	0
Wyoming [3]	164,282	195,687	160,345	195,687	3,937	0
Total	3,754,485	4,203,329	3,724,648	4,202,868	29,837	461
Southern Rocky Mountain:						
Arizona [3]	306,295	491,706	289,445	491,131	16,850	575
Colorado [3]	671,734	341,219	609,698	332,813	62,036	8,406
Nevada [3]	10,412	63	10,102	63	310	0
New Mexico [3]	252,516	262,103	226,625	259,314	25,891	2,789
Utah [3]	85,122	69,689	75,409	69,569	9,713	120
Total	1,326,079	1,164,780	1,211,279	1,152,890	114,800	11,890
Total, Rocky Mountain	5,080,564	5,368,109	4,935,927	5,355,758	144,637	12,351
Total, all regions	59,919,125	62,770,077	40,256,739	47,738,769	19,662,386	15,031,308

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[1] Zeros indicate no data or negligible amounts.

[2] Growth estimate for Hawaii is not available.

[3] See footnote 2, table 3.

TABLE 27.—*Annual mortality of growing stock and sawtimber on commercial timberland in the United States, by softwoods and hardwoods, ownership, and timber supply region, 1952, 1962, and 1970* [1]

GROWING STOCK—THOUSAND CUBIC FEET

Species group and timber supply region	Total, all ownerships			National Forest			Other public			Forest industry			Farm and miscellaneous private		
	1970	1962	1952	1970	1962	1952	1970	1962	1952	1970	1962	1952	1970	1962	1952
SOFTWOODS															
Northeast	207, 938	180, 000	150, 800	4, 692	4, 180	3, 570	9, 292	7, 927	6, 911	66, 109	46, 051	37, 876	127, 845	121, 842	102, 443
Northcentral	151, 769	120, 693	77, 501	28, 999	23, 988	17, 228	49, 442	41, 347	27, 858	21, 334	16, 042	8, 363	51, 994	39, 316	24, 052
Total, North	359, 707	300, 693	228, 301	33, 691	28, 168	20, 798	58, 734	49, 274	34, 769	87, 443	62, 093	46, 239	179, 839	161, 158	126, 495
Southeast	292, 999	260, 200	234, 700	12, 401	10, 300	11, 800	18, 407	16, 400	11, 100	54, 708	50, 200	44, 200	207, 483	183, 300	167, 600
Southcentral	163, 775	131, 100	97, 400	21, 296	18, 000	11, 632	3, 537	2, 900	2, 800	53, 830	50, 000	38, 748	85, 112	60, 200	44, 220
Total, South	456, 774	391, 300	332, 100	33, 697	28, 300	23, 432	21, 944	19, 300	13, 900	108, 538	100, 200	82, 948	292, 595	243, 500	211, 820
PNW Douglas-fir	626, 700	663, 200	700, 300	281, 900	296, 500	296, 400	125, 400	127, 100	127, 900	164, 000	188, 200	223, 600	55, 400	51, 400	52, 400
PNW ponderosa pine	247, 100	250, 300	252, 200	117, 900	120, 900	110, 900	67, 400	69, 200	82, 100	27, 400	29, 600	31, 600	34, 400	30, 600	27, 600
Alaska—Coastal	165, 663	170, 754	173, 431	151, 953	156, 622	159, 078	12, 837	13, 232	13, 439	0	0	0	873	900	914
California and Hawaii	338, 500	350, 100	366, 800	196, 500	202, 500	199, 500	10, 400	12, 400	16, 500	46, 100	48, 000	53, 500	85, 500	87, 200	97, 300
Total, Pacific Coast	1, 377, 963	1, 434, 354	1, 492, 731	748, 253	776, 522	765, 878	216, 037	221, 932	239, 939	237, 500	265, 800	308, 700	176, 173	170, 100	178, 214
Northern Rocky Mountain [2]	387, 397	400, 700	374, 000	278, 597	296, 900	276, 200	38, 471	36, 508	34, 550	22, 154	21, 653	20, 878	48, 175	45, 639	42, 372
Southern Rocky Mountain [2]	176, 732	199, 100	192, 900	100, 932	122, 600	113, 400	28, 253	29, 460	31, 858	1, 326	1, 310	1, 328	46, 221	45, 730	46, 314
Total, Rocky Mountain	564, 129	599, 800	566, 900	379, 529	419, 500	389, 600	66, 724	65, 968	66, 408	23, 480	22, 963	22, 206	94, 396	91, 369	88, 686
Total, softwoods	2, 758, 573	2, 726, 147	2, 620, 032	1, 195, 170	1, 252, 490	1, 199, 708	363, 439	356, 474	355, 016	456, 961	451, 056	460, 093	743, 003	666, 127	605, 215
HARDWOODS															
Northeast	356, 776	301, 400	248, 200	14, 309	12, 030	9, 810	33, 391	27, 528	21, 982	41, 510	33, 963	29, 138	267, 566	227, 879	187, 270
Northcentral	540, 033	430, 811	321, 840	46, 997	36, 522	25, 742	87, 401	68, 557	45, 689	36, 865	28, 122	16, 854	368, 770	297, 610	233, 555
Total, North	896, 809	732, 211	570, 040	61, 306	48, 552	35, 552	120, 792	96, 085	67, 671	78, 375	62, 085	45, 992	636, 336	525, 489	420, 825
Southeast	323, 132	301, 000	283, 800	20, 675	19, 000	18, 600	11, 580	9, 400	6, 300	44, 679	42, 000	43, 800	246, 198	230, 600	215, 100
Southcentral	390, 430	399, 400	337, 300	15, 670	17, 600	10, 927	14, 885	10, 700	7, 859	73, 295	73, 000	50, 275	286, 580	298, 100	268, 239
Total, South	713, 562	700, 400	621, 100	36, 345	36, 600	29, 527	26, 465	20, 100	14, 159	117, 974	115, 000	94, 075	532, 778	528, 700	483, 339
PNW Douglas-fir	73, 600	62, 400	49, 400	7, 200	6, 700	5, 800	19, 200	16, 100	13, 300	21, 800	17, 900	12, 700	25, 400	21, 700	17, 600
PNW ponderosa pine	1, 500	1, 400	1, 300	300	300	300	400	400	400	100	100	100	700	600	500
Alaska—Coastal	1, 437	1, 447	1, 470	1, 318	1, 327	1, 348	111	112	114	0	0	0	8	8	8
California and Hawaii	10, 900	10, 700	10, 100	7, 300	7, 500	7, 400	300	300	300	1, 900	1, 500	1, 100	1, 400	1, 400	1, 300
Total, Pacific Coast	87, 437	75, 947	62, 270	16, 118	15, 827	14, 848	20, 011	16, 912	14, 114	23, 800	19, 500	13, 900	27, 508	23, 708	19, 408
Northern Rocky Mountain [2]	4, 702	4, 500	4, 100	1, 202	1, 300	1, 100	1, 188	1, 063	993	354	332	329	1, 958	1, 805	1, 678
Southern Rocky Mountain [2]	43, 903	34, 400	30, 500	26, 103	18, 200	16, 100	5, 521	5, 044	4, 450	147	132	112	12, 132	11, 024	9, 838
Total, Rocky Mountain	48, 605	38, 900	34, 600	27, 305	19, 500	17, 200	6, 709	6, 107	5, 443	501	464	441	14, 090	12, 829	11, 516
Total, hardwoods	1, 746, 413	1, 547, 458	1, 288, 010	141, 074	120, 479	97, 127	173, 977	139, 204	101, 387	220, 650	197, 049	154, 408	1, 210, 712	1, 090, 726	935, 088

SAWTIMBER—THOUSAND BOARD FEET, INTERNATIONAL ¼-INCH LOG RULE

SOFTWOODS															
Northeast	352,927	273,000	242,000	9,531	8,245	7,630	12,165	10,557	9,292	110,874	64,512	56,271	220,357	189,686	168,807
Northcentral	308,483	229,804	137,589	39,167	30,397	20,660	96,382	74,691	47,808	57,497	41,059	19,080	115,437	83,657	50,041
Total, North	661,410	502,804	379,589	48,698	38,642	28,290	108,547	85,248	57,100	168,371	105,571	75,351	335,794	273,343	218,848
Southeast	695,512	613,000	564,000	32,146	26,000	32,700	54,007	48,400	29,800	143,937	132,000	109,200	465,422	406,600	392,300
Southcentral	570,145	440,000	319,300	67,205	63,600	39,800	12,261	8,500	8,100	208,094	177,300	142,400	282,585	190,600	129,000
Total, South	1,265,657	1,053,000	883,300	99,351	89,600	72,500	66,268	56,900	37,900	352,031	309,300	251,600	748,007	597,200	521,300
PNW Douglas-fir	3,317,000	3,776,800	4,107,100	1,611,400	1,746,200	1,772,900	610,500	713,900	734,400	865,300	1,093,200	1,356,800	229,800	223,500	243,000
PNW ponderosa pine	1,079,100	1,127,300	1,208,400	552,700	577,700	562,800	291,800	306,900	372,800	115,000	131,000	158,000	119,600	111,700	114,800
Alaska—Coastal	876,212	904,339	920,205	803,697	829,496	844,049	67,898	70,077	71,307	0	0	0	4,617	4,766	4,849
California and Hawaii	1,604,000	1,751,000	1,936,000	1,027,000	1,103,000	1,118,000	53,000	65,000	93,000	185,000	211,000	260,000	339,000	372,000	465,000
Total, Pacific Coast	6,876,312	7,559,439	8,171,705	3,994,797	4,256,396	4,297,749	1,023,198	1,155,877	1,271,507	1,165,300	1,435,200	1,774,800	693,017	711,966	827,649
Northern Rocky Mountain [2]	1,809,959	1,676,000	1,623,000	1,395,959	1,263,000	1,213,000	152,026	150,993	151,523	98,122	100,500	100,932	163,852	161,507	157,545
Southern Rocky Mountain [2]	735,785	841,000	847,000	439,785	528,000	504,000	116,075	126,991	145,067	5,049	5,269	5,685	174,876	180,740	192,248
Total, Rocky Mountain	2,545,744	2,517,000	2,470,000	1,835,744	1,791,000	1,717,000	268,101	277,984	296,590	103,171	105,769	106,617	338,728	342,247	349,793
Total, softwoods	11,349,123	11,632,243	11,904,594	5,978,590	6,175,638	6,115,539	1,466,114	1,576,009	1,663,097	1,788,873	1,955,840	2,208,368	2,115,546	1,924,756	1,917,590
HARDWOODS															
Northeast	458,017	375,000	329,000	22,067	19,325	18,450	33,928	27,655	22,263	74,783	49,413	45,061	327,239	278,607	243,226
Northcentral	1,211,400	986,698	811,637	62,370	52,252	38,244	135,501	103,116	70,900	85,537	63,278	38,737	927,992	768,052	663,756
Total, North	1,669,417	1,361,698	1,140,637	84,437	71,577	56,694	169,429	130,771	93,163	160,320	112,691	83,798	1,255,231	1,046,659	906,982
Southeast	833,882	796,000	781,000	73,406	68,000	52,600	28,878	24,100	17,100	131,977	128,200	128,400	599,621	575,700	582,900
Southcentral	1,109,456	1,186,000	962,300	37,102	48,300	29,600	44,796	35,300	23,000	223,060	207,000	142,400	804,498	895,400	767,300
Total, South	1,943,338	1,982,000	1,743,300	110,508	116,300	82,200	73,674	59,400	40,100	355,037	335,200	270,800	1,404,119	1,471,100	1,350,200
PNW Douglas-fir	234,600	191,900	158,800	42,100	35,300	30,300	64,500	47,500	40,200	58,600	51,100	38,600	69,400	58,000	49,700
PNW ponderosa pine	3,700	3,300	2,900	800	900	700	1,600	1,400	1,400	300	200	200	1,000	800	600
Alaska—Coastal	6,088	7,661	7,795	5,584	7,026	7,150	472	594	604	0	0	0	32	41	41
California and Hawaii	23,000	22,600	22,200	13,800	14,500	14,800	1,100	1,000	1,200	4,500	3,600	2,800	3,600	3,500	3,400
Total, Pacific Coast	267,388	225,461	191,695	62,284	57,726	52,950	67,672	50,494	43,404	63,400	54,900	41,600	74,032	62,341	53,741
Northern Rocky Mountain [2]	13,903	12,000	12,000	2,903	2,000	2,000	3,620	3,220	3,220	1,440	1,412	1,412	5,940	5,368	5,368
Southern Rocky Mountain [2]	88,417	61,000	59,000	60,417	35,000	34,000	7,974	7,480	7,169	396	395	346	19,630	18,125	17,485
Total, Rocky Mountain	102,320	73,000	71,000	63,320	37,000	36,000	11,594	10,700	10,389	1,836	1,807	1,758	25,570	23,493	22,853
Total, hardwoods	3,982,463	3,642,159	3,146,632	320,549	282,603	227,844	322,369	251,365	187,056	580,593	504,598	397,956	2,758,952	2,603,593	2,333,776

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[1] Zeros indicate no data or negligible amounts.

[2] See footnote 2, table 3.

TABLE 28.—*Output of timber products and timber removals for the Northeast supply region, by source of material and softwoods and hardwoods, 1970*

Products and additional removals	Species group	Standard units	Total output		Plant byproducts output		Output of roundwood products						Output from sawtimber
							All sources roundwood products		Growing-stock trees	Rough and rotten trees [1]	Salvable dead trees [1]	Other sources [1]	
			Number of units	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	936, 266	164, 415	0	0	936, 266	164, 415	154, 112	2, 337	450	7, 516	690, 910
Do	Hardwoods	do	1, 795, 664	295, 268	0	0	1, 795, 664	295, 268	285, 186	4, 197	895	4, 990	1, 456, 116
Total		do	2, 731, 930	459, 683	0	0	2, 731, 930	459, 683	439, 298	6, 534	1, 345	12, 506	2, 147, 026
Veneer logs and bolts	Softwoods	do	14, 115	2, 171	0	0	14, 115	2, 171	2, 103	0	0	68	13, 819
Do	Hardwoods	do	109, 947	17, 257	0	0	109, 947	17, 257	16, 804	15	0	438	99, 921
Total		do	124, 062	19, 428	0	0	124, 062	19, 428	18, 907	15	0	506	113, 740
Pulpwood	Softwoods	Standard cords	3, 241, 449	271, 857	347, 038	28, 703	2, 894, 411	243, 154	189, 699	5, 856	3, 519	44, 080	570, 399
Do	Hardwoods	do	2, 824, 651	230, 776	584, 190	47, 036	2, 240, 461	183, 740	164, 455	3, 412	899	14, 974	464, 358
Total		do	6, 066, 100	502, 633	931, 228	75, 739	5, 134, 872	426, 894	354, 154	9, 268	4, 418	59, 054	1, 034, 757
Miscellaneous industrial:													
Cooperage	Softwoods	Thousand board feet	4, 350	752	0	0	4, 350	752	739				3, 807
Do	Hardwoods	do	15, 699	2, 133	0	0	15, 699	2, 133	2, 095				13, 162
Piling	Softwoods	Thousand linear feet	4, 594	2, 753	0	0	4, 594	2, 753	2, 691				13, 280
Do	Hardwoods	do	953	571	0	0	953	571	566				2, 188
Poles	Softwoods	Thousand pieces	33	345	0	0	33	345	342				1, 644
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Mine timbers (round)	Softwoods	Thousand cubic feet	1, 082	1, 082	0	0	1, 082	1, 082	909				2, 152
Do	Hardwoods	do	15, 008	15, 008	0	0	15, 008	15, 008	14, 510				41, 778
Posts (round and split)	Softwoods	Thousand pieces	3, 007	2, 506	24	24	2, 983	2, 482	1, 840				3, 804
Do	Hardwoods	do	7, 684	7, 237	0	0	7, 684	7, 237	6, 684				19, 585
Other	Softwoods	Thousand cubic feet	25, 180	25, 180	19, 449	19, 449	5, 731	5, 731	5, 257				16, 512
Do	Hardwoods	do	44, 567	44, 567	26, 549	26, 549	18, 018	18, 018	16, 684				41, 517
Summary, all miscellaneous.	Softwoods			32, 618		19, 473		13, 145	11, 778	58	26	1, 283	41, 199
Do	Hardwoods			69, 516		26, 549		42, 967	40, 539	338	144	1, 946	118, 230
Total				102, 134		46, 022		56, 112	52, 317	396	170	3, 229	159, 429
Fuelwood	Softwoods	Standard cords	156, 552	12, 524	138, 538	11, 083	18, 014	1, 441	483	539	210	209	1, 064
Do	Hardwoods	do	950, 463	76, 038	369, 820	29, 586	580, 643	46, 452	32, 485	5, 486	4, 448	4, 033	77, 296
Total, all products	Softwoods			483, 585		59, 259		424, 326	358, 175	8, 790	4, 205	53, 156	1, 317, 391
Do	Hardwoods			688, 855		103, 171		585, 684	539, 469	13, 448	6, 386	26, 381	2, 215, 921
Do	All species			1, 172, 440		162, 430		1, 010, 010	897, 644	22. 238	10, 591	79, 537	3, 533, 312
Additional removals:													
Logging residues	Softwoods								52, 473				44, 594
Do	Hardwoods								124, 557				118, 509
Total									177, 030				163, 103
Other removals	Softwoods								23, 423				79, 334
Do	Hardwoods								65, 949				256, 810
Total									89, 375				336, 144
Total removals	Softwoods								434, 074				1, 441, 319
Do	Hardwoods								729, 975				2, 591, 240
Total									1, 164, 049				4, 032, 559

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[1] Output from nongrowing stock sources is not shown for miscellaneous products excepts in combined form.

TABLE 29.—*Output of timber products and timber removals for the North Central supply region, by source of material and softwoods and hardwoods, 1970*

Products and additional removals	Species group	Standard units	Total output		Plant byproducts output		Output of roundwood products						Output from sawtimber
							All sources roundwood products		Growing-stock trees	Rough and rotten trees [1]	Salvable dead trees [1]	Other sources [1]	
			Number of units	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	206,783	33,867	0	0	206,783	33,867	33,177	340	327	23	194,000
Do	Hardwoods	do	2,450,412	375,207	0	0	2,450,412	375,207	346,268	10,471	4,472	13,996	2,217,777
Total		do	2,657,195	409,074	0	0	2,657,195	409,074	379,445	10,811	4,799	14,019	2,411,777
Veneer logs and bolts	Softwoods	do	0	0	0	0	0	0	0	0	0	0	0
Do	Hardwoods	do	90,937	13,293	0	0	90,937	13,293	12,499	678	0	116	87,324
Total		do	90,937	13,293	0	0	90,937	13,293	12,499	678	0	116	87,324
Pulpwood	Softwoods	Standard cords	1,415,826	111,769	63,306	5,002	1,352,520	106,767	102,839	2,041	872	1,015	320,676
Do	Hardwoods	do	3,879,374	306,956	691,926	54,866	3,187,448	252,090	240,274	2,194	2,348	7,274	574,300
Total		do	5,295,200	418,725	755,232	59,868	4,539,968	358,857	343,113	4,235	3,220	8,289	894,976
Miscellaneous industrial:													
Cooperage	Softwoods	Thousand board feet	0	0	0	0	0	0	0				0
Do	Hardwoods	do	113,502	16,662	0	0	113,502	16,662	13,010				89,770
Piling	Softwoods	Thousand linear feet	120	77	0	0	120	77	77				362
Do	Hardwoods	do	590	283	0	0	590	283	283				1,793
Poles	Softwoods	Thousand pieces	259	1,443	0	0	259	1,443	1,418				4,181
Do	Hardwoods	do	8	69	0	0	8	69	69				272
Mine timbers (round)	Softwoods	Thousand cubic feet	1,509	1,509	0	0	1,509	1,509	1,200				4,159
Do	Hardwoods	do	7,684	7,684	0	0	7,684	7,684	7,125				16,798
Posts (round and split)	Softwoods	Thousand pieces	7,063	6,756	0	0	7,063	6,756	5,909				4,872
Do	Hardwoods	do	5,374	3,855	0	0	5,374	3,855	2,576				7,237
Other	Softwoods	Thousand cubic feet	4,231	4,231	1,510	1,510	2,721	2,721	2,712				9,258
Do	Hardwoods	do	86,115	86,115	33,044	33,044	53,071	53,071	42,680				196,164
Summary, all miscellaneous.	Softwoods			14,016		1,510		12,506	11,316	205	309	676	22,832
Do	Hardwoods			114,668		33,044		81,624	65,743	5,980	665	9,236	312,034
Total				128,684		34,554		94,130	77,059	6,185	974	9,912	334,866
Fuelwood	Softwoods	Standard cords	59,776	4,160	34,668	2,435	25,108	1,725	651	154	75	845	1,264
Do	Hardwoods	do	1,894,313	133,131	445,061	31,673	1,449,252	101,458	38,210	7,302	6,122	49,824	89,442
Total, all products	Softwoods			163,812		8,947		154,865	147,983	2,740	1,583	2,559	538,772
Do	Hardwoods			943,255		119,583		823,672	702,994	26,625	13,607	80,446	3,280,877
Do	All species			1,107,067		128,530		978,537	850,977	29,365	15,190	83,005	3,819,649
Additional removals;													
Logging residues	Softwoods								8,774				19,984
Do	Hardwoods								96,999				329,346
Total									105,773				349,330
Other removals	Softwoods								37,957				101,620
Do	Hardwoods								275,721				646,830
Total									313,678				748,450
Total removals	Softwoods								194,714				660,376
Do	Hardwoods								1,075,714				4,257,053
Total									1,270,428				4,917,429

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[1] Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

TABLE 30.—*Output of timber products and timber removals for the North, by source of material and softwoods and hardwoods, 1970*

Products and additional removals	Species group	Standard units	Total output		Plant byproducts output		Output of roundwood products						Output from sawtimber
							All sources roundwood products		Growing-stock trees	Rough and rotten trees [1]	Salvable dead trees [1]	Other sources [1]	
			Number of units	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	1,143,049	198,282	0	0	1,143,049	198,282	187,289	2,677	777	7,539	884,910
Do	Hardwoods	do	4,246,076	670,475	0	0	4,246,076	670,475	631,454	14,668	5,367	18,986	3,673,893
Total			5,389,125	868,757	0	0	5,389,125	868,757	818,743	17,345	6,144	26,525	4,558,803
Veneer logs and bolts	Softwoods	do	14,115	2,171	0	0	14,115	2,171	2,103	0	0	68	13,819
Do	Hardwoods	do	200,884	30,550	0	0	200,884	30,550	29,303	693	0	554	187,245
Total			214,999	32,721	0	0	214,999	32,721	31,403	693	0	622	201,064
Pulpwood	Softwoods	Standard cords	4,657,275	383,626	410,344	33,705	4,246,931	349,921	292,538	7,897	4,391	45,095	891,075
Do	Hardwoods	do	6,704,025	537,732	1,276,116	101,902	5,427,909	435,830	404,729	5,606	3,247	22,248	1,038,658
Total			11,361,300	921,358	1,686,460	135,607	9,674,840	785,751	697,267	13,503	7,638	67,34	1,929,733
Miscellaneous industrial—													
Cooperage	Softwoods	Thousand board feet	4,350	752	0	0	4,350	752	739				3,807
Do	Hardwoods	do	129,201	18,795	0	0	129,201	18,795	15,105				102,932
Piling	Softwoods	Thousand linear feet	4,714	2,830	0	0	4,714	2,830	2,768				13,642
Do	Hardwoods	do	1,543	854	0	0	1,543	854	849				3,981
Poles	Softwoods	Thousand pieces	292	1,788	0	0	292	1,788	1,760				5,825
Do	Hardwoods	do	8	69	0	0	8	69	69				272
Mine timbers (round)	Softwoods	Thousand cubic feet	2,591	2,591	0	0	2,591	2,591	2,109				6,311
Do	Hardwoods	do	22,692	22,692	0	0	22,692	22,692	21,635				58,576
Posts (round and split)	Softwoods	Thousand pieces	10,070	9,262	24	24	10,046	9,238	7,749				8,676
Do	Hardwoods	do	13,058	11,092	0	0	13,058	11,092	9,260				26,822
Other	Softwoods	Thousand cubic feet	29,411	29,411	20,959	20,959	8,452	8,452	7,969				25,770
Do	Hardwoods	do	130,682	130,682	59,593	59,593	71,089	71,089	59,364				237,681
Summary all miscellaneous	Softwoods			46,634		20,983		25,651	23,094	263	335	1,959	64,031
Do	Hardwoods			184,184		59,593		124,591	106,282	6,318	809	11,182	430,264
Total				230,818		80,576		150,242	129,376	6,581	1,144	13,141	494,295
Fuelwood	Softwoods	Standard cords	216,328	16,684	173,206	13,518	43,122	3,166	1,134	693	285	1,054	2,328
Do	Hardwoods	do	2,844,776	209,169	814,881	61,259	2,029,895	147,910	70,695	12,788	10,570	53,857	166,738
Total, all products	Softwoods			647,397		68,206		579,191	506,158	11,530	5,788	55,715	1,856,163
Do	Hardwoods			1,632,110		222,754		1,409,356	1,242,463	40,073	19,993	106,827	5,496,798
Do	All species			2,279,507		290,960		1,988,547	1,748,621	51,603	25,781	162,542	7,352,961
Additional removals—													
Logging residues	Softwoods								61,247				64,578
Do	Hardwoods								221,556				447,855
Total									282,803				512,433
Other removals	Softwoods								61,383				180,954
Do	Hardwoods								341,670				903,640
Total									403,053				1,084,594
Total removals	Softwoods								628,788				2,101,695
Do	Hardwoods								1,805,689				6,848,293
Total									2,434,477				8,949,988

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[1] Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

TABLE 31.—*Output of timber products and timber removals for the Southeast supply region, by source of material and softwoods and hardwoods, 1970*

Products and additional removals	Species group	Standard units	Total output		Plant byproducts output		Output of roundwood products						Output from sawtimber
							All sources roundwood products		Growing-stock trees	Rough and rotten trees [1]	Salvable dead trees [1]	Other sources [1]	
			Number of units	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	3,218,789	552,332	0	0	3,218,789	552,332	539,348	3,294	1,450	8,240	2,823,360
Do	Hardwoods	do	1,810,769	290,249	1,157	260	1,809,612	289,989	271,532	13,994	0	4,463	1,487,124
Total		do	5,029,558	842,581	1,157	260	5,028,401	842,321	810,880	17,288	1,450	12,703	4,310,484
Veneer logs and bolts	Softwoods	do	268,872	43,998	0	0	268,872	43,998	42,460	0	0	1,538	239,598
Do	Hardwoods	do	381,589	58,821	0	0	381,589	58,821	56,744	805	0	1,272	347,649
Total		do	650,461	102,819	0	0	650,461	102,819	99,204	805	0	2,810	587,247
Pulpwood	Softwoods	Standard cords	16,340,861	1,202,741	2,695,170	197,847	13,645,691	1,004,894	919,081	19,415	8,703	57,695	1,811,858
Do	Hardwoods	do	4,176,567	308,125	867,485	63,787	3,309,082	244,338	207,466	18,131	1,603	17,138	405,948
Total		do	20,517,428	1,510,866	3,562,655	261,634	16,954,773	1,249,232	1,126,547	37,546	10,306	74,833	2,217,806
Miscellaneous industrial;													
Cooperage	Softwoods	Thousand board feet	0	0	0	0	0	0	0				0
Do	Hardwoods	do	24,127	3,176	0	0	24,127	3,176	3,175				23,377
Piling	Softwoods	Thousand linear feet	5,257	2,503	0	0	5,257	2,503	2,485				12,503
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Poles	Softwoods	Thousand pieces	1,418	21,390	0	0	1,418	21,390	21,077				114,477
Do	Hardwoods	do	8	144	0	0	8	144	144				677
Mine timbers (round)	Softwoods	Thousand cubic feet	47	47	0	0	47	47	36				68
Do	Hardwoods	do	407	407	0	0	407	407	384				774
Posts (round and split)	Softwoods	Thousand pieces	12,007	6,402	80	44	11,927	6,358	5,494				6,405
Do	Hardwoods	do	1,126	603	0	0	1,126	603	352				276
Other	Softwoods	Thousand cubic feet	9,928	9,928	862	862	9,066	9,066	8,693				33,249
Do	Hardwoods	do	10,762	10,762	984	984	9,778	9,778	8,939				35,688
Summary, all miscellaneous	Softwoods			40,270		906		39,364	37,785	225	42	1,312	166,702
Do	Hardwoods			15,092		984		14,108	12,994	889	23	202	60,792
Total				55,362		1,890		53,472	50,779	1,114	65	1,514	227,494
Fuelwood	Softwoods	Standard cords	726,937	53,529	105,483	8,363	621,454	45,166	38,472	3,012	90	3,592	33,426
Do	Hardwoods	do	1,324,715	97,612	154,787	11,812	1,169,928	85,800	58,579	19,443	75	7,703	53,081
Total, all products	Softwoods			1,892,870		207,116		1,685,754	1,577,146	25,946	10,285	72,377	5,074,944
Do	Hardwoods			769,899		76,843		693,056	607,315	53,262	1,701	30,778	2,354,594
Do	All species			2,662,769		283,959		2,378,810	2,184,461	79,208	11,986	103,155	7,429,538
Additional removal:													
Logging residues	Softwoods								99,693				296,778
Do	Hardwoods								238,558				301,842
Total									338,251				598,620
Other removals	Softwoods								122,526				461,848
Do	Hardwoods								213,201				285,439
Total									335,727				747,287
Total removals	Softwoods								1,799,365				5,833,570
Do	Hardwoods								1,059,074				2,941,875
Total									2,858,439				8,775,445

[1] Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

TABLE 32.—*Output of timber products and timber removals for the South Central supply region, by source of material and softwoods and hardwoods, 1970*

Products and additional removals	Species group	Standard units	Total output		Plant byproducts output		Output of roundwood products						Output from sawtimber
							All sources roundwood products		Growing-stock trees	Rough and rotten trees [1]	Salvable dead trees [1]	Other sources [1]	
			Number of units	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	4, 838, 965	787, 182	108, 745	9, 062	4, 730, 220	778, 120	772, 913	947	0	4, 260	4, 672, 960
Do	Hardwoods	do	2, 108, 825	351, 541	0	0	2, 108, 825	351, 541	338, 469	4, 640	8, 222	210	1, 981, 616
Total		do	6, 947, 790	1, 138, 723	108, 745	9, 062	6, 839, 045	1, 129, 661	1, 111, 382	5, 587	8, 222	4, 470	6, 654, 576
Veneer logs and bolts	Softwoods	do	1, 293, 980	212, 856	0	0	1, 293, 980	212, 856	211, 447	258	0	1, 151	1, 278, 395
Do	Hardwoods	do	206, 039	34, 571	0	0	206, 039	34, 571	33, 975	450	0	146	200, 496
Total		do	1, 500, 019	247, 427	0	0	1, 500, 019	247, 427	245, 422	708	0	1, 297	1, 478, 891
Pulpwood	Softwoods	Standard cords	16, 054, 628	1, 300, 425	3, 874, 437	313, 827	12, 180, 191	986, 598	939, 498	6, 539	0	40, 561	2, 575, 091
Do	Hardwoods	do	5, 580, 385	446, 434	1, 167, 996	93, 444	4, 412, 389	352, 990	283, 572	53, 539	907	14, 972	617, 057
Total		do	21, 635, 013	1, 746, 859	5, 042, 433	407, 271	16, 592, 580	1, 339, 588	1, 223, 070	60, 078	907	55, 533	3, 192, 148
Miscellaneous industrial:													
Cooperage	Softwoods	Thousand board feet	8, 443	1, 384	0	0	8, 443	1, 384	1, 368				7, 385
Do	Hardwoods	do	48, 619	6, 984	0	0	48, 619	6, 984	6, 905				46, 383
Piling	Softwoods	Thousand linear feet	13, 995	11, 087	0	0	13, 995	11, 087	11, 041				64, 349
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Poles	Softwoods	Thousand pieces	3, 025	35, 496	0	0	3, 025	35, 496	35, 232				175, 325
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Mine timbers (round)	Softwoods	Thousand cubic feet	307	307	0	0	307	307	307				29
Do	Hardwoods	do	102	102	0	0	102	102	102				0
Posts (round and split)	Softwoods	Thousand pieces	27, 827	15, 284	0	0	27, 827	15, 284	13, 906				5, 412
Do	Hardwoods	do	25, 508	16, 391	0	0	25, 508	16, 391	14, 489				15, 756
Other	Softwoods	Thousand cubic feet	23, 895	23, 895	20, 322	20, 322	3, 573	3, 573	3, 333				6, 362
Do	Hardwoods	do	42, 441	42, 441	11, 508	11, 508	30, 933	30, 933	27, 600				98, 702
Summary, all miscellaneous	Softwoods			87, 453		20, 322		67, 131	65, 187	121	3	1, 820	258, 862
Do	Hardwoods			65, 918		11, 508		54, 410	49, 096	2, 063	540	2, 711	160, 841
Total				153, 371		31, 830		121, 541	114, 283	2, 184	543	4, 531	419, 703
Fuelwood	Softwoods	Standard cords	1, 135, 068	85, 758	946, 878	71, 597	188, 190	14, 161	9, 474	720	1, 060	2, 907	7, 828
Do	Hardwoods	do	3, 141, 277	235, 675	721, 578	54, 191	2, 419, 699	181, 484	124, 146	9, 040	12, 605	35, 693	109, 293
Total, all products	Softwoods			2, 473, 674		414, 808		2, 058, 866	1, 998, 519	8, 585	1, 063	50, 699	8, 793, 136
Do	Hardwoods			1, 134, 139		159, 143		974, 996	829, 258	69, 732	22, 274	53, 732	3, 069, 303
Do	All species			3, 607, 813		573, 951		3, 033, 862	2, 827, 777	78, 317	23, 337	104, 431	11, 862, 439
Additional removals:													
Logging residues	Softwoods								162, 998				270, 180
Do	Hardwoods								181, 667				390, 435
Total									344, 665				660, 615
Other removals	Softwoods								35, 253				148, 726
Do	Hardwoods								416, 833				1, 392, 918
Total									452, 086				1, 541, 644
Total removals	Softwoods								2, 196, 770				9, 212, 042
Do	Hardwoods								1, 427, 758				4, 852, 656
Total									3, 624, 528				14, 064, 698

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[1] Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

TABLE 33.—*Output of timber products and timber removals for the South, by source of material and softwoods and hardwoods, 1970*

Products and additional removals	Species group	Standard units	Total output		Plant byproducts output		Output of roundwood products						Output from sawtimber
							All sources roundwood products		Growing-stock trees	Rough and rotten trees [1]	Salvable dead trees [1]	Other sources [1]	
			Number of units	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	8, 057, 754	1, 339, 514	108, 745	9, 062	7, 949, 009	1, 330, 452	1, 312, 261	4, 241	1, 450	12, 500	7, 496, 320
Do	Hardwoods	do	3, 919, 594	641, 790	1, 157	260	3, 918, 437	641, 530	610, 001	18, 634	8, 222	4, 673	3, 468, 740
Total		do	11, 977, 348	1, 981, 304	109, 902	9, 322	11, 867, 446	1, 971, 982	1, 922, 262	22, 875	9, 672	17, 173	10, 965, 060
Veneer logs and bolts	Softwoods	do	1, 562, 852	256, 854	0	0	1, 562, 852	256, 854	253, 907	258	0	2, 689	1, 517, 993
Do	Hardwoods	do	587, 628	93, 392	0	0	587, 628	93, 392	90, 719	1, 255	0	1, 418	548, 145
Total		do	2, 150, 480	350, 246	0	0	2, 150, 480	350, 246	344, 626	1, 513	0	4, 107	2, 066, 138
Pulpwood	Softwoods	Standard cords	32, 395, 489	2, 503, 166	6, 569, 607	511, 674	25, 825, 882	1, 991, 492	1, 858, 579	25, 954	8, 703	98, 256	4, 386, 949
Do	Hardwoods	do	9, 756, 952	754, 559	2, 035, 481	157, 231	7, 721, 471	597, 328	491, 038	71, 670	2, 510	32, 110	1, 023, 005
Total		do	42, 152, 441	3, 257, 725	8, 605, 088	668, 905	33, 547, 353	2, 588, 820	2, 349, 617	97, 624	11, 213	130, 366	5, 409, 954
Miscellaneous industrial:													
Cooperage	Softwoods	Thousand board feet	8, 443	1, 384	0	0	8, 443	1, 384	1, 368				7, 385
Do	Hardwoods	do	72, 746	10, 160	0	0	72, 746	10, 160	10, 080				69, 760
Piling	Softwoods	Thousand linear feet	19, 252	13, 590	0	0	19, 252	13, 590	13, 526				76, 852
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Poles	Softwoods	Thousand pieces	4, 443	56, 886	0	0	4, 443	56, 886	56, 309				289, 802
Do	Hardwoods	do	8	144	0	0	8	144	144				677
Mine timbers (round)	Softwoods	Thousand cubic feet	354	354	0	0	354	354	343				97
Do	Hardwoods	do	509	509	0	0	509	509	486				774
Posts (round and split)	Softwoods	Thousand pieces	39, 834	21, 686	80	44	39, 754	21, 642	19, 400				11, 817
Do	Hardwoods	do	26, 634	16, 994	0	0	26, 634	16, 994	14, 841				16, 032
Other	Softwoods	Thousand cubic feet	33, 823	33, 823	21, 184	21, 184	12, 639	12, 639	12, 026				39, 611
Do	Hardwoods	do	53, 203	53, 203	12, 492	12, 492	40, 711	40, 711	36, 539				134, 390
Summary, all miscellaneous	Softwoods			127, 723		21, 228		106, 495	102, 972	346	45	3, 132	425, 564
Do	Hardwoods			81, 010		12, 492		68, 518	62, 090	2, 952	563	2, 913	221, 633
Total				208, 733		33, 720		175, 013	165, 062	3, 298	608	6, 045	647, 197
Fuelwood	Softwoods	Standard cords	1, 862, 005	139, 287	1, 052, 361	79, 960	809, 644	59, 327	47, 946	3, 732	1, 150	6, 499	41, 254
Do	Hardwoods	do	4, 465, 992	333, 287	876, 365	66, 003	3, 589, 627	267, 284	182, 725	28, 483	12, 680	43, 396	162, 374
Total, all products	Softwoods			4, 366, 544		621, 924		3, 744, 620	3, 575, 665	34, 531	11, 348	123, 076	13, 868, 080
Do	Hardwoods			1, 904, 038		235, 986		1, 668, 052	1, 436, 573	122, 994	23, 975	84, 510	5, 423, 897
Do	All species			6, 270, 582		857, 910		5, 412, 672	5, 012, 238	157, 525	35, 323	207, 586	19, 291, 977
Additional removals:													
Logging residues	Softwoods								262, 691				566, 958
Do	Hardwoods								420, 225				692, 277
Total									682, 916				1, 259, 235
Other removals	Softwoods								157, 779				610, 574
Do	Hardwoods								630, 034				1, 678, 357
Total									787, 813				2, 288, 931
Total removals	Softwoods								3, 996, 135				15, 045, 612
Do	Hardwoods								2, 486, 832				7, 794, 531
Total									6, 482, 967				22, 840, 143

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[1] Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

TABLE 34.—*Output of timber products and timber removals for the Douglas-fir supply region, by source of material and softwoods and hardwoods, 1970*

Products and additional removals	Species group	Standard units	Total output		Plant byproducts output		Output of roundwood products						Output from sawtimber
							All sources roundwood products		Growing-stock trees	Rough and rotten trees [1]	Salvable dead trees [1]	Other sources [1]	
			Number of units	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	9,603,548	1,438,985	276,479	67,445	9,327,069	1,371,510	1,264,469	4,887	58,183	44,001	8,596,797
Do	Hardwoods	do	125,397	35,040	0	0	125,397	35,040	32,140	0	2,890	10	120,231
Total		do	9,728,945	1,474,025	276,479	67,445	9,452,466	1,406,580	1,296,609	4,887	61,073	44,011	8,717,028
Veneer logs and bolts	Softwoods	do	3,864,089	531,138	0	0	3,864,089	531,138	454,601	4,582	30,711	41,244	3,299,611
Do	Hardwoods	do	6,368	1,546	0	0	6,368	1,546	1,464	0	82	0	6,004
Total		do	3,870,457	532,684	0	0	3,870,457	532,684	456,065	4,582	30,793	41,244	3,305,615
Pulpwood	Softwoods	Standard cords	11,445,615	982,880	7,642,580	655,819	3,803,035	327,061	266,322	5,119	8,149	47,471	1,476,174
Do	Hardwoods	do	342,721	29,474	0	0	342,721	29,474	28,615	0	859	0	117,715
Total		do	11,788,336	1,012,354	7,642,580	655,819	4,145,756	356,535	294,937	5,119	9,008	47,471	1,593,889
Miscellaneous industrial:													
Cooperage	Softwoods	Thousand board feet	0	0	0	0	0	0	0				0
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Piling	Softwoods	Thousand linear feet	2,483	1,840	0	0	2,483	1,840	1,840				8,984
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Poles	Softwoods	Thousand pieces	238	6,263	0	0	238	6,263	6,263				27,063
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Mine timbers (round)	Softwoods	Thousand cubic feet	41	41	0	0	41	41	41				190
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Posts (round and split)	Softwoods	Thousand pieces	846	930	0	0	846	930	930				3,892
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Other	Softwoods	Thousand cubic feet	111,784	111,784	55,200	55,200	56,584	56,584	44,661				317,149
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Summary, all miscellaneous.	Softwoods			120,858		55,200		65,658	53,735	0	10,641	1,282	357,278
Do	Hardwoods			0		0		0	0	0	0	0	0
Total				120,858		55,200		65,658	53,735	0	10,641	1,282	357,278
Fuelwood	Softwoods	Standard cords	3,131,988	269,351	2,954,213	254,062	177,775	15,289	3,273	430	11,156	430	14,342
Do	Hardwoods	do	5,093	438	0	0	5,093	438	81	0	0	357	350
Total, all products	Softwoods			3,343,212		1,032,526		2,310,686	2,042,400	15,018	118,840	134,428	13,744,202
Do	Hardwoods			66,498		0		66,498	62,300	0	3,831	367	244,300
Do	All species			3,409,710		1,032,526		2,377,184	2,104,700	15,018	122,671	134,795	13,988,502
Additional removals:													
Logging residues	Softwoods								330,600				1,063,800
Do	Hardwoods								15,700				36,700
Total									346,300				1,100,500
Other removals	Softwoods								47,000				275,998
Do	Hardwoods								6,000				20,000
Total									53,000				295,998
Total removals	Softwoods								2,420,000				15,084,000
Do	Hardwoods								84,000				301,000
Total									2,504,000				15,385,000

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[1] Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

TABLE 35.—*Output of timber products and timber removals for the ponderosa pine supply region, by source of material and softwoods and hardwoods, 1970*

Products and additional removals	Species group	Standard units	Total output		Plant byproducts output		Output of roundwood products						Output from sawtimber
							All sources Roundwood products		Growing-stock trees	Rough and rotten trees[1]	Salvable dead trees [1]	Other sources [1]	
			Number of units	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	2,870,368	471,562	27,943	6,323	2,842,425	465,239	452,679	325	9,307	2,928	2,765,467
Do	Hardwoods	do	7,187	1,620	0	0	7,187	1,620	1,600	0	16	4	7,100
Total		do	2,877,555	473,182	27,943	6,323	2,849,612	466,859	454,279	325	9,323	2,932	2,772,567
Veneer logs and bolts	Softwoods	do	445,583	69,452	0	0	445,583	69,452	68,616	0	767	69	440,415
Do	Hardwoods	do	0	0	0	0	0	0	0	0	0	0	0
Total		do	445,583	69,452	0	0	445,583	69,452	68,616	0	767	69	440,415
Pulpwood	Softwoods	Standard cords	356,954	30,698	323,570	27,827	33,384	2,871	2,871	0	0	0	12,900
Do	Hardwoods	do	0	0	0	0	0	0	0	0	0	0	0
Total		do	356,954	30,698	323,570	27,827	33,384	2,871	2,871	0	0	0	12,900
Miscellaneous industrial:													
Cooperage	Softwoods	Thousand board feet	0	0	0	0	0	0	0				0
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Piling	Softwoods	Thousand linear feet	0	0	0	0	0	0	0				0
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Poles	Softwoods	Thousand pieces	21	580	0	0	21	580	563				2,766
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Mine timbers (round)	Softwoods	Thousand cubic feet	110	110	0	0	110	110	107				480
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Posts (round and split)	Softwoods	Thousand pieces	1,634	1,789	0	0	1,634	1,789	1,190				6,904
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Other	Softwoods	Thousand cubic feet	12,276	12,276	12,006	12,006	270	270	260				1,170
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Summary, all miscellaneous	Softwoods			14,755		12,006		2,749	2,120	2	21	606	11,320
Do	Hardwoods			0		0		0	0	0	0	0	0
Total				14,755		12,006		2,749	2,120	2	21	606	11,320
Fuelwood	Softwoods	Standard cords	803,290	69,083	718,093	61,756	85,197	7,327	1,794	1,338	4,195	0	8,858
Do	Hardwoods	do	0	0	0	0	0	0	0	0	0	0	0
Total, all products	Softwoods			655,550		107,912		547,638	528,080	1,665	14,290	3,603	3,238,960
Do	Hardwoods			1,620		0		1,620	1,600	0	16	4	7,100
Do	All species			657,170		107,912		549,258	529,680	1,665	14,306	3,607	3,246,060
Additional removals:													
Logging residues	Softwoods								33,920				102,040
Do	Hardwoods								400				1,100
Total									34,320				103,140
Other removals	Softwoods								24,000				150,000
Do	Hardwoods								70				240
Total									24,070				150,240
Total removals	Softwoods								586,000				3,491,000
Do	Hardwoods								2,070				8,440
Total									588,070				3,499,440

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[1] Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

TABLE 36.—*Output of timber products and timber removals for Coastal Alaska, by source of material and softwoods and hardwoods, 1970*

Products and additional removals	Species group	Standard units	Total output		Plant byproducts output		Output of roundwood products						Output from sawtimber
							All sources roundwood products		Growing-stock trees	Rough and rotten trees [1]	Salvable dead trees [1]	Other sources [1]	
			Number of units	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	302,774	47,785	0	0	302,774	47,785	47,785	0	0	0	302,774
Do	Hardwoods	do	0	0	0	0	0	0	0	0	0	0	0
Total		do	302,774	47,785	0	0	302,774	47,785	47,785	0	0	0	302,774
Veneer logs and bolts	Softwoods	do	0	0	0	0	0	0	0	0	0	0	0
Do	Hardwoods	do	0	0	0	0	0	0	0	0	0	0	0
Total		do	0	0	0	0	0	0	0	0	0	0	0
Pulpwood	Softwoods	Standard cords	880,666	79,296	89,444	8,086	791,222	71,210	69,985	0	1,225	0	443,439
Do	Hardwoods	do	0	0	0	0	0	0	0	0	0	0	0
Total		do	880,666	79,296	89,444	8,086	791,222	71,210	69,985	0	1,225	0	443,439
Miscellaneous industrial:													
Cooperage	Softwoods	Thousand board feet	0	0	0	0	0	0	0				0
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Piling	Softwoods	Thousand linear feet	0	0	0	0	0	0	0				0
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Poles	Softwoods	Thousand pieces	0	0	0	0	0	0	0				0
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Mine timbers (round)	Softwoods	Thousand cubic feet	0	0	0	0	0	0	0				0
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Posts (round and split)	Softwoods	Thousand pieces	0	0	0	0	0	0	0				0
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Other	Softwoods	Thousand cubic feet	0	0	0	0	0	0	0				0
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Summary, all miscellaneous	Softwoods			0		0		0	0	0	0	0	0
Do	Hardwoods			0		0		0	0	0	0	0	0
Total				0		0		0	0	0	0	0	0
Fuelwood	Softwoods	Standard cords	0	0	0	0	0	0	0	0	0	0	0
Do	Hardwoods	do	0	0	0	0	0	0	0	0	0	0	0
Total, all products	Softwoods			127,081		8,086		118,995	117,770	0	1,225	0	746,213
Do	Hardwoods			0		0		0	0	0	0	0	0
Do	All species			127,081		8,086		118,995	117,770	0	1,225	0	746,213
Additional removals:													
Logging residues	Softwoods								39,320				79,881
Do	Hardwoods								0				0
Total									39,320				79,881
Other removals	Softwoods								0				253,491
Do	Hardwoods								0				0
Total									0				253,491
Total removals	Softwoods								157,090				1,079,585
Do	Hardwoods								0				0
Total									157,090				1,079,585

[1] Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

TABLE 37.—*Output of timber products and timber removals for California and Hawaii, by source of material and softwoods and hardwoods, 1970*

Products and additional removals	Species group	Standard units	Total output		Plant byproducts output		Output of roundwood products						Output from sawtimber
							All sources roundwood products		Growing-stock trees	Rough and rotten trees [1]	Salvable dead trees [1]	Other sources [1]	
			Number of units	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	4, 856, 558	751, 789	15, 984	2, 398	4, 840, 574	749, 391	711, 921	0	17, 236	20, 234	4, 615, 807
Do	Hardwoods	do	19, 065	5, 520	0	0	19, 065	5, 520	5, 520	0	0	0	19, 065
Total		do	4, 875, 623	757, 309	15, 984	2, 398	4, 859, 639	754, 911	717, 441	0	17, 236	20, 234	4, 634, 872
Veneer logs and bolts	Softwoods	do	513, 309	67, 862	0	0	513, 309	67, 862	61, 621	0	1, 424	4, 817	466, 102
Do	Hardwoods	do	967	138	0	0	967	138	138	0	0	0	967
Total		do	514, 276	68, 000	0	0	514, 276	68, 000	61, 759	0	1, 424	4, 817	467, 069
Pulpwood	Softwoods	Standard cords	1, 453, 049	124, 962	1, 449, 340	124, 643	3, 709	319	319	0	0	0	1, 594
Do	Hardwoods	do	46, 220	3, 975	3, 046	262	43, 174	3, 713	2, 746	0	0	967	12, 692
Total		do	1, 499, 269	128, 937	1, 452, 386	124, 902	46, 883	4, 032	3, 065	0	0	967	14, 286
Miscellaneous industrial:													
Cooperage	Softwoods	Thousand board feet	0	0	0	0	0	0	0				0
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Piling	Softwoods	Thousand linear feet	658	598	0	0	658	598	598				2, 985
Do	Hardwoods	do	31	28	0	0	31	28	28				152
Poles	Softwoods	Thousand pieces	129	3, 588	0	0	129	3, 588	3, 586				12, 785
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Mine timbers (round)	Softwoods	Thousand cubic feet	267	267	0	0	267	267	212				757
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Post (round and split)	Softwoods	Thousand pieces	356	463	0	0	356	463	310				1, 103
Do	Hardwoods	do	10	20	0	0	10	20	20				0
Other	Softwoods	Thousand cubic feet	34, 945	34, 945	31, 912	31, 912	3, 033	3, 033	2, 203				16, 666
Do	Hardwoods	do	60	60	0	0	60	60	15				106
Summary, all miscellaneous.	Softwoods			39, 861		31, 912		7, 949	6, 909	0	529	511	34, 296
Do	Hardwoods			108		0		108	63	0	0	45	258
Total				39, 969		31, 912		8, 057	6, 972	0	529	556	34, 554
Fuelwood	Softwoods	Standard cords	1, 218, 268	104, 771	1, 195, 291	102, 795	22, 977	1, 976	247	1, 422	267	40	1, 320
Do	Hardwoods	do	85, 604	7, 352	0	0	85, 604	7, 352	3, 029	410	3, 353	560	10, 824
Total, all products	Softwoods			1, 089, 245		261, 748		827, 497	781, 017	1, 422	19, 456	25, 602	5, 119, 119
Do	Hardwoods			17, 093		262		16, 831	11, 496	410	3, 353	1, 572	43, 806
Do	All species			1, 106, 338		262, 010		844, 328	792, 513	1, 832	22, 809	27, 174	5, 162, 925
Additional removals:													
Logging residues	Softwoods								92, 000				286, 000
Do	Hardwoods								13, 479				11, 607
Total									105, 479				297, 607
Other removals	Softwoods								28, 000				176, 000
Do	Hardwoods								3, 165				11, 280
Total									31, 165				187, 280
Total removals	Softwoods								901, 017				5, 581, 119
Do	Hardwoods								28, 140				66, 693
Total									929, 157				5, 647, 812

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[1] Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

TABLE 38.—*Output of timber products and timber removals for the Pacific Coast, by source of material and softwoods and hardwoods, 1970*

Products and additional removals	Species group	Standard units	Total output		Plant byproducts output		Output of roundwood products						Output from sawtimber
							All sources roundwood products		Growing-stock trees	Rough and rotten trees [1]	Salvable dead trees [1]	Other sources [1]	
			Number of units	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	17,633,248	2,710,121	320,406	76,166	17,312,842	2,633,955	2,476,854	5,212	84,726	67,163	16,280,845
Do	Hardwoods	do	151,649	42,180	0	0	151,649	42,180	39,260	0	2,906	14	146,396
Total		do	17,784,897	2,752,301	320,406	76,166	17,464,491	2,676,135	2,516,114	5,212	87,632	67,177	16,427,241
Veneer logs and bolts	Softwoods	do	4,822,981	668,452	0	0	4,822,981	668,452	584,838	4,582	32,902	46,130	4,206,128
Do	Hardwoods	do	7,335	1,684	0	0	7,335	1,684	1,602	0	82	0	6,971
Total		do	4,830,316	670,136	0	0	4,830,316	670,136	586,440	4,582	32,984	46,130	4,213,099
Pulpwood	Softwoods	Standard cords	14,136,284	1,217,836	9,504,934	816,375	4,631,350	401,461	339,497	5,119	9,374	47,471	1,934,107
Do	Hardwoods	do	388,941	33,449	3,046	262	385,895	33,187	31,361	0	859	967	130,407
Total		do	14,525,225	1,251,285	9,507,980	816,637	5,017,245	434,648	370,858	5,119	10,233	48,438	2,064,514
Miscellaneous industrial:													
Cooperage	Softwoods	Thousand board feet	0	0	0	0	0	0	0				0
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Piling	Softwoods	Thousand linear feet	3,141	2,438	0	0	3,141	2,438	2,438				11,969
Do	Hardwoods	do	31	28	0	0	31	28	28				152
Poles	Softwoods	Thousand pieces	388	10,431	0	0	388	10,431	10,412				42,614
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Mine timbers (round)	Softwoods	Thousand cubic feet	418	418	0	0	418	418	360				1,427
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Post (round and split)	Softwoods	Thousand pieces	2,836	3,182	0	0	2,836	3,182	2,430				11,899
Do	Hardwoods	do	10	20	0	0	10	20	20				0
Other	Softwoods	Thousand cubic feet	159,005	159,005	99,118	99,118	59,887	59,887	47,124				334,985
Do	Hardwoods	do	60	60	0	0	60	60	15				106
Summary, all miscellaneous.	Softwoods			175,474		99,118		76,356	62,764	2	11,191	2,399	402,894
Do	Hardwoods	do		108		0		108	63	0	0	45	258
Total		do		175,582		99,118		76,464	62,827	2	11,191	2,444	403,152
Fuelwood	Softwoods	Standard cords	5,153,546	443,205	4,867,597	418,613	285,949	24,592	5,314	3,190	15,618	470	24,520
Do	Hardwoods	do	90,697	7,790	0	0	90,697	7,790	3,110	410	3,353	917	11,174
Total, all products	Softwoods	do		5,215,088		1,410,272		3,804,816	3,469,267	18,105	153,811	163,633	22,848,494
Do	Hardwoods	do		85,211		262		84,949	75,396	410	7,200	1,943	295,206
Do	All species	do		5,300,299		1,410,534		3,889,765	3,544,663	18,515	161,011	165,576	23,143,700
Additional removals:													
Logging residues	Softwoods								495,840				1,531,721
Do	Hardwoods	do							29,579				49,407
Total		do							525,419				
Other removals	Softwoods	do							99,000				855,489
Do	Hardwoods	do							9,235				31,520
Total		do							108,235				887,009
Total removals	Softwoods	do							4,064,107				25,235,704
Do	Hardwoods	do							114,210				376,133
Total		do							4,178,317				25,611,837

[1] Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

TABLE 39.—*Output of timber products and timber removals for the Northern Rocky Mountain States, by source of material and softwoods and hardwoods, 1970*

Products and additional removals	Species group	Standard units	Total output		Plant byproducts output		Output of roundwood products						Output from sawtimber
							All sources roundwood products		Growing-stock trees	Rough and rotten trees [1]	Salvable dead trees [1]	Other sources [1]	
			Number of units	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	3,523,713	549,699	0	0	3,523,713	549,699	540,320	0	8,446	933	3,301,513
Do	Hardwoods	do	324	50	0	0	324	50	49	0	1	0	305
Total		do	3,524,037	549,749	0	0	3,524,037	549,749	540,369	0	8,447	933	3,301,818
Veneer logs and bolts	Softwoods	do	445,281	67,682	0	0	445,281	67,682	66,567	0	1,029	86	418,792
Do	Hardwoods	do	115	18	0	0	115	18	17	0	0	1	110
Total		do	445,396	67,700	0	0	445,396	67,700	66,584	0	1,029	87	418,902
Pulpwood	Softwoods	Standard cords	1,977,730	146,900	1,742,755	126,692	234,975	20,208	18,481	629	1,044	54	101,827
Do	Hardwoods	do	0	0	0	0	0	0	0	0	0	0	0
Total		do	1,977,730	146,900	1,742,755	126,692	234,975	20,208	18,481	629	1,044	54	101,827
Miscellaneous industrial:													
Cooperage	Softwoods	Thousand board feet	0	0	0	0	0	0	0				0
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Piling	Softwoods	Thousand linear feet	69	52	0	0	69	52	51				242
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Poles	Softwoods	Thousand pieces	241	4,468	0	0	241	4,468	4,460				20,724
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Mine timbers (round)	Softwoods	Thousand cubic feet	2,316	2,316	0	0	2,316	2,316	1,947				5,063
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Posts (round and split)	Softwoods	Thousand pieces	3,826	3,911	0	0	3,826	3,911	3,172				11,212
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Other	Softwoods	Thousand cubic feet	15,672	15,672	11,455	11,455	4,217	4,217	3,797				21,418
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Summary, all miscellaneous.	Softwoods			26,419		11,455		14,964	13,427	102	1,419	16	58,659
Do	Hardwoods			0		0		0	0	0	0	0	0
Total				26,419		11,455		14,964	13,427	102	1,419	16	58,659
Fuelwood	Softwoods	Standard cords	986,580	78,050	969,295	76,563	17,285	1,487	11	18	1,427	31	6
Do	Hardwoods	do	2,477	213	13	1	2,464	212	1	0	207	4	1
Total, all products	Softwoods			868,750		214,710		654,040	638,806	749	13,365	1,120	3,880,797
Do	Hardwoods			281		1		280	67	0	208	5	416
Do	All species			869,031		214,711		654,320	638,873	749	13,573	1,125	3,881,213
Additional removals:													
Logging residues	Softwoods								84,234				257,679
Do	Hardwoods								10				29
Total									84,244				257,708
Other removals	Softwoods								10,359				64,392
Do	Hardwoods								1				16
Total									10,360				64,408
Total removals	Softwoods								733,399				4,202,868
Do	Hardwoods								78				461
Total									733,477				4,203,329

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[1] Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

TABLE 40.—*Output of timber products and timber removals for the Southern Rocky Mountain States, by source of material and softwoods and hardwoods, 1970*

Products and additional removals	Species group	Standard units	Total output		Plant byproducts output		Output of roundwood products						Output from sawtimber
							All sources roundwood products		Growing-stock trees	Rough and rotten trees [1]	Salvable dead trees [1]	Other sources [1]	
			Number of units	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	1,024,780	159,865	0	0	1,024,780	159,865	157,316	0	2,104	445	987,603
Do	Hardwoods	do	6,174	963	0	0	6,174	963	947	0	14	2	5,916
Total		do	1,030,954	160,828	0	0	1,030,954	160,828	158,263	0	2,118	447	993,519
Veneer logs and bolts	Softwoods	do	35,713	5,428	0	0	35,713	5,248	5,299	0	109	20	33,950
Do	Hardwoods	do	0	0	0	0	0	0	0	0	0	0	0
Total		do	35,713	5,428	0	0	35,713	5,248	5,299	0	109	20	33,950
Pulpwood	Softwoods	Standard cords	450,503	33,879	347,406	25,012	103,097	8,867	8,867	0	0	0	26,360
Do	Hardwoods	do	0	0	0	0	0	0	0	0	0	0	0
Total		do	450,503	33,879	347,406	25,012	103,097	8,867	8,867	0	0	0	26,360
Miscellaneous industrial:													
Cooperage	Softwoods	Thousand board feet	0	0	0	0	0	0	0				0
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Piling	Softwoods	Thousand linear feet	0	0	0	0	0	0	0				0
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Poles	Softwoods	Thousand pieces	46	631	0	0	46	631	630				2,934
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Mine timbers (round)	Softwoods	Thousand cubic feet	3,115	3,115	0	0	3,115	3,115	2,627				6,579
Do	Hardwoods	do	93	93	0	0	93	93	32				49
Posts (round and split)	Softwoods	Thousand pieces	1,505	1,895	0	0	1,505	1,895	1,614				9,096
Do	Hardwoods	do	4	4	0	0	4	4	0				0
Other	Softwoods	Thousand cubic feet	3,440	3,440	3,191	3,191	249	249	206				780
Do	Hardwoods	do	1,388	1,388	39	39	1,349	1,349	1,245				4,593
Summary, all miscellaneous	Softwoods			9,081		3,191		5,890	5,077	6	566	241	19,389
Do	Hardwoods			1,485		39		1,446	1,277	89	72	8	4,642
Total				10,566		3,230		7,336	6,354	95	638	249	24,031
Fuelwood	Softwoods	Standard cords	350,472	29,186	135,243	10,677	215,229	18,509	134	0	8,110	10,265	215
Do	Hardwoods	do	92,236	7,930	287	22	91,949	7,908	65	0	5,418	2,425	107
Total, all products	Softwoods			237,439		38,880		198,559	176,693	6	10,889	10,971	1,067,517
Do	Hardwoods			10,378		61		10,317	2,289	89	5,504	2,435	10,665
Do	All species			247,817		38,941		208,876	178,982	95	16,393	13,406	1,078,182
Additional removals:													
Logging residues	Softwoods								18,641				53,091
Do	Hardwoods								225				525
Total									18,866				53,616
Other removals	Softwoods								5,582				32,282
Do	Hardwoods								140				700
Total									5,722				32,982
Total removals	Softwoods								200,916				1,152,890
Do	Hardwoods								2,654				11,890
Total									203,570				1,164,780

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[1] Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

TABLE 41.—*Output of timber products and timber removals for the Rocky Mountain States, by source of material and softwoods and hardwoods, 1970*

Products and additional removals	Species group	Standard units	Total output		Plant byproducts output		Output of roundwood products						Output from sawtimber
							All sources roundwood products		Growing-stock trees	Rough and rotten trees [1]	Salvable dead trees [1]	Other sources [1]	
			Number of units	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	4,548,493	709,564	0	0	4,548,493	709,564	697,636	0	10,550	1,378	4,289,116
Do	Hardwoods	do	6,498	1,013	0	0	6,498	1,013	996	0	15	2	6,221
Total		do	4,554,991	710,577	0	0	4,554,991	710,577	698,632	0	10,565	1,380	4,295,337
Veneer logs and bolts	Softwoods	do	480,994	73,110	0	0	480,994	73,110	71,866	0	1,138	106	452,742
Do	Hardwoods	do	115	18	0	0	115	18	17	0	0	1	110
Total		do	481,109	73,128	0	0	481,109	73,128	71,883	0	1,138	107	452,852
Pulpwood	Softwoods	Standard cords	2,428,233	180,779	2,090,161	151,704	338,072	29,075	27,348	629	1,044	54	128,187
Do	Hardwoods	do	0	0	0	0	0	0	0	0	0	0	0
Total		do	2,428,233	180,779	2,090,161	151,704	338,072	29,075	27,348	629	1,044	54	128,187
Miscellaneous industrial:													
Cooperage	Softwoods	Thousand board feet	0	0	0	0	0	0	0				0
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Piling	Softwoods	Thousand linear feet	69	52	0	0	69	52	51				242
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Poles	Softwoods	Thousand pieces	287	5,099	0	0	287	5,099	5,090				23,658
Do	Hardwoods	do	0	0	0	0	0	0	0				0
Mine timbers (round)	Softwoods	Thousand cubic feet	5,431	5,431	0	0	5,431	5,431	4,574				11,642
Do	Hardwoods	do	93	93	0	0	93	93	32				49
Posts (round and split)	Softwoods	Thousand pieces	5,331	5,806	0	0	5,331	5,806	4,786				20,308
Do	Hardwoods	do	4	4	0	0	4	4	0				0
Other	Softwoods	Thousand cubic feet	19,112	19,112	14,646	14,646	4,466	4,466	4,003				22,198
Do	Hardwoods	do	1,388	1,388	39	39	1,349	1,349	1,245				4,593
Summary, all miscellaneous	Softwoods			35,500		14,646		20,854	18,504	108	1,985	257	78,048
Do	Hardwoods			1,485		39		1,446	1,277	89	72	8	4,642
Total				36,985		14,685		22,300	19,781	197	2,057	265	82,690
Fuelwood	Softwoods	Standard cords	1,337,052	107,236	1,104,538	87,240	232,514	19,996	145	18	9,537	10,296	221
Do	Hardwoods	do	94,713	8,143	300	23	94,413	8,120	66	0	5,625	2,429	108
Total, all products	Softwoods			1,106,189		253,590		852,599	815,499	755	24,254	12,091	4,948,314
Do	Hardwoods			10,659		62		10,597	2,356	89	5,712	2,440	11,081
Do	All species			1,116,848		253,652		863,196	817,855	844	29,966	14,531	4,959,395
Additional removals:													
Logging residues	Softwoods								102,875				310,770
Do	Hardwoods								235				554
Total									103,110				311,324
Other removals	Softwoods								15,941				96,674
Do	Hardwoods								141				716
Total									16,082				97,390
Total removals	Softwoods								934,315				5,355,758
Do	Hardwoods								2,732				12,351
Total									937,047				5,386,109

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[1] Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

TABLE 42.—*Output of timber products and timber removals for the United States by source of material and softwoods and hardwoods, 1970*

Products and additional removals	Species group	Standard units	Total output		Plant byproducts output		Output of roundwood products						Output from sawtimber
							All sources roundwood products		Growing-stock trees	Rough and rotten trees [1]	Salvable dead trees [1]	Other sources [1]	
			Number of units	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Number of units*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	31, 382, 544	4, 957, 481	429, 151	85, 228	30, 953, 393	4, 872, 253	4, 674, 040	12, 130	97, 503	88, 580	28, 951, 191
Do	Hardwoods	do	8, 323, 817	1, 355, 458	1, 157	260	8, 322, 660	1, 355, 198	1, 281, 711	33, 302	16, 510	23, 675	7, 295, 250
Total		do	39, 706, 361	6, 312, 939	430, 308	85, 488	39, 276, 053	6, 227, 451	5, 955, 751	45, 432	114, 013	112, 255	36, 246, 441
Veneer logs and bolts	Softwoods	do	6, 880, 942	1, 000, 587	0	0	6, 880, 942	1, 000, 587	912, 714	4, 840	34, 040	48, 993	6, 190, 682
Do	Hardwoods	do	795, 962	125, 644	0	0	795, 962	125, 644	121, 641	1, 948	82	1, 973	742, 471
Total		do	7, 676, 904	1, 126, 231	0	0	7, 676, 904	1, 126, 231	1, 034, 355	6, 788	34, 122	50, 966	6, 933, 153
Pulpwood	Softwoods	Standard cords	53, 617, 281	4, 285, 407	18, 575, 046	1, 513, 458	35, 042, 235	2, 771, 949	2, 517, 962	39, 599	23, 512	190, 876	7, 340, 318
Do	Hardwoods	do	16, 849, 918	1, 325, 740	3, 314, 643	259, 395	13, 535, 275	1, 066, 345	927, 128	77, 276	6, 616	55, 325	2, 192, 070
Total		do	70, 467, 199	5, 611, 147	21, 889, 689	1, 772, 853	48, 577, 510	3, 838, 294	3, 445, 090	116, 875	30, 128	246, 201	9, 532, 388
Miscellaneous industrial:													
Cooperage	Softwoods	Thousand board feet	12, 793	2, 136	0	0	12, 793	2, 136	2, 107				11, 192
Do	Hardwoods	do	201, 947	28, 955	0	0	201, 947	28, 955	25, 185				172, 692
Piling	Softwoods	Thousand linear feet	27, 176	18, 910	0	0	27, 176	18, 910	18, 783				102, 705
Do	Hardwoods	do	1, 574	882	0	0	1, 574	882	877				4, 133
Poles	Softwoods	Thousand pieces	5, 410	74, 204	0	0	5, 410	74, 204	73, 571				361, 899
Do	Hardwoods	do	16	213	0	0	16	213	213				949
Mine timbers (round)	Softwoods	Thousand cubic feet	8, 794	8, 794	0	0	8, 794	8, 794	7, 386				19, 477
Do	Hardwoods	do	23, 294	23, 294	0	0	23, 294	23, 294	22, 153				59, 399
Posts (round and split)	Softwoods	Thousand pieces	58, 071	39, 936	104	68	57, 967	39, 868	34, 365				52, 700
Do	Hardwoods	do	39, 706	28, 110	0	0	39, 706	28, 110	24, 121				42, 854
Other	Softwoods	Thousand cubic feet	241, 351	241, 351	155, 907	155, 907	85, 444	85, 444	71, 122				422, 564
Do	Hardwoods	do	185, 333	185, 333	72, 124	72, 124	113, 209	113, 209	97, 163				376, 770
Summary, all miscellaneous	Softwoods			385, 331		155, 975		229, 356	207, 334	719	13, 556	7, 747	970, 537
Do	Hardwoods			266, 787		72, 124		194, 663	169, 712	9, 359	1, 444	14, 148	656, 797
Total				652, 118		228, 099		424, 019	377, 046	10, 078	15, 000	21, 895	1, 627, 334
Fuelwood	Softwoods	Standard cords	8, 568, 931	706, 412	7, 197, 702	599, 331	1, 371, 229	107, 081	54, 539	7, 633	26, 590	18, 319	68, 323
Do	Hardwoods	do	7, 496, 178	558, 389	1, 691, 546	127, 285	5, 804, 632	431, 104	256, 596	41, 681	32, 228	100, 599	349, 394
Total, all products	Softwoods			11, 335, 218		2, 353, 992		8, 981, 226	8, 366, 589	64, 921	195, 201	354, 515	43, 521, 051
Do	Hardwood			3, 632, 018		459, 064		3, 172, 954	2, 756, 788	163, 566	56, 880	195, 720	11, 226, 982
Do	All species			14, 967, 236		2, 813, 056		12, 154, 180	11, 123, 377	228, 487	252, 081	550, 235	54, 748, 033
Additional removals:													
Logging residues	Softwoods								922, 653				2, 474, 027
Do	Hardwoods								671, 595				1, 190, 093
Total									1, 594, 248				3, 664, 120
Other removals	Softwoods								334, 103				1, 743, 691
Do	Hardwoods								981, 080				2, 614, 233
Total									1, 315, 183				4, 357, 924
Total removals	Softwoods								9, 623, 345				47, 738, 769
Do	Hardwoods								4, 409, 463				15, 031, 308
Total									14, 032, 808				62, 770, 077

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[1] Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

TABLE 43.—*Volume of unused residues at primary manufacturing plants in the United States, by timber supply region, industrial source, type of material, softwoods and hardwoods, 1970* [1]

[Thousand cubic feet]

Species group and timber supply region	All industries			Lumber industry			Veneer and plywood industry			Other primary industries		
	Total	Coarse	Fine	Total	Coarse	Fine	Total	Coarse	Fine	Total	Coarse	Fine
SOFTWOODS												
Northeast	23,608	11,483	12,125	22,504	11,121	11,383	0	0	0	1,104	362	742
Northcentral	6,942	4,153	2,789	6,942	4,153	2,789	0	0	0	0	0	0
Total, North	30,550	15,636	14,914	29,446	15,274	14,172	0	0	0	1,104	362	742
Southeast	89,427	19,586	69,841	87,177	18,315	68,862	1,379	787	592	871	484	387
Southcentral	85,998	31,665	54,333	74,643	28,375	46,268	2,071	213	1,858	9,284	3,077	6,207
Total, South	175,425	51,251	124,174	161,820	46,690	115,130	3,450	1,000	2,450	10,155	3,561	6,594
PNW Douglas-fir	131,096	57,414	73,682	81,575	26,415	55,160	25,535	22,812	2,723	23,986	8,187	15,799
PNW ponderosa pine	45,711	21,829	23,882	43,244	19,605	23,639	2,440	2,211	229	27	13	14
Alaska—Coastal	8,371	6,605	1,766	8,371	6,605	1,766	0	0	0	0	0	0
California and Hawaii	152,080	68,782	83,298	145,840	62,542	83,298	6,033	6,033	0	207	207	0
Total, Pacific Coast	337,258	154,630	182,628	279,030	115,167	163,863	34,008	31,056	2,952	24,220	8,407	15,813
Northern Rocky Mountain	92,985	33,117	59,868	92,666	32,798	59,868	319	319	0	0	0	0
Southern Rocky Mountain	45,631	15,104	30,527	45,447	14,920	30,527	184	184	0	0	0	0
Total, Rocky Mountain	138,616	48,221	90,395	138,113	47,718	90,395	503	503	0	0	0	0
Total, softwoods	681,849	269,738	412,111	608,409	224,849	383,560	37,961	32,559	5,402	35,479	12,330	23,149
HARDWOODS												
Northeast	71,485	41,206	30,279	68,114	39,878	28,236	436	94	342	2,935	1,234	1,701
Northcentral	70,034	30,619	39,417	63,922	28,839	35,083	747	175	572	5,365	1,605	3,760
Total, North	141,519	71,825	69,694	132,036	68,717	63,319	1,183	269	914	8,300	2,839	5,461
Southeast	77,791	23,779	54,012	71,637	20,040	51,597	3,265	2,591	674	2,889	1,148	1,741
Southcentral	89,772	35,896	53,876	75,750	29,996	45,754	2,415	2,089	326	11,607	3,811	7,796
Total, South	167,563	59,675	107,888	147,387	50,036	97,351	5,680	4,680	1,000	14,496	4,959	9,537
PNW Douglas-fir	1,637	582	1,055	1,561	512	1,049	76	70	6	0	0	0
PNW ponderosa pine	0	0	0	0	0	0	0	0	0	0	0	0
Alaska—Coastal	0	0	0	0	0	0	0	0	0	0	0	0
California and Hawaii	0	0	0	0	0	0	0	0	0	0	0	0
Total, Pacific Coast	1,637	582	1,055	1,561	512	1,049	76	70	6	0	0	0
Northern Rocky Mountain	10	5	5	10	5	5	0	0	0	0	0	0
Southern Rocky Mountain	435	230	205	435	230	205	0	0	0	0	0	0
Total, Rocky Mountain	445	235	210	445	235	210	0	0	0	0	0	0
Total, hardwoods	311,164	132,317	178,847	281,429	119,500	161,929	6,939	5,019	1,920	22,796	7,798	14,998

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[1] Zeros indicate no data or negligible amounts.

TABLE 44.—*Roundwood products, logging residues, and other removals from growing stock and sawtimber, by section, region, State and species group, 1970*

Section, region, and State	Species	Roundwood products			Logging residues		Other removals	
		All Sources	Growing stock	Saw-timber	Growing stock	Saw-timber	Growing stock	Saw-timber
		Thousand cubic feet	*Thousand cubic feet*	*Thousand board feet*	*Thousand cubic feet*	*Thousand board feet*	*Thousand cubic feet*	*Thousand board feet*
New England:								
Connecticut	Softwoods	1,049	951	2,715	59	139	300	833
Do	Hardwoods	6,386	5,028	17,671	633	1,563	1,582	5,372
Maine	Softwoods	284,135	231,703	826,811	36,188	26,539	7,309	24,650
Do	Hardwoods	123,511	108,469	377,581	19,618	28,875	5,413	14,544
Massachusetts	Softwoods	12,256	10,862	45,745	1,276	3,452	2,571	10,662
Do	Hardwoods	13,530	12,103	53,301	2,371	5,669	2,146	9,390
New Hampshire	Softwoods	21,418	20,474	86,945	1,198	135	2,963	11,915
Do	Hardwoods	29,773	27,915	96,118	3,302	11,165	4,638	13,398
Rhode Island	Softwoods	490	429	1,057	16	40	48	112
Do	Hardwoods	1,603	1,238	3,924	63	158	582	1,109
Vermont	Softwoods	17,143	15,908	52,260	1,818	2,773	4,317	14,615
Do	Hardwoods	25,035	21,485	76,368	4,778	7,975	2,689	8,981
Total	Softwoods	336,491	280,327	1,015,533	40,555	33,078	17,508	62,787
	Hardwoods	199,838	176,238	624,963	30,765	55,405	17,050	52,794

TABLE 44.—*Roundwood products, logging residues, and other removals from growing stock and sawtimber, by section, region, State and species group, 1970*—Continued

Section, region, and State	Species	Roundwood products			Logging residues		Other removals	
		All Sources	Growing stock	Saw-timber	Growing stock	Saw-timber	Growing stock	Saw-timber
		Thousand cubic feet	*Thousand cubic feet*	*Thousand board feet*	*Thousand cubic feet*	*Thousand board feet*	*Thousand cubic feet*	*Thousand board feet*
Middle Atlantic:								
Delaware	Softwoods	8, 844	7, 004	19, 604	387	33	946	1, 866
Do	Hardwoods	2, 964	2, 474	8, 936	585	677	462	1, 868
Maryland	Softwoods	27, 449	25, 056	119, 263	5, 631	7, 144	87	430
Do	Hardwoods	31, 986	29, 757	142, 739	9, 149	23, 760	5, 892	27, 249
New Jersey	Softwoods	6, 866	4, 550	10, 109	316	37	635	1, 423
Do	Hardwoods	7, 608	5, 537	22, 158	593	689	670	2, 643
New York	Softwoods	19, 482	18, 000	61, 818	3, 696	3, 605	287	968
Do	Hardwoods	80, 194	69, 493	305, 054	15, 976	11, 957	7, 452	32, 513
Pennsylvania	Softwoods	13, 002	12, 070	43, 434	1, 261	599	3, 112	8, 586
Do	Hardwoods	145, 332	140, 768	542, 632	46, 887	16, 842	27, 657	106, 537
West Virginia	Softwoods	12, 192	11, 168	47, 630	627	98	851	3, 274
Do	Hardwoods	117, 762	115, 202	569, 439	20, 602	9, 179	6, 766	33, 206
Total	Softwoods	87, 835	77, 848	301, 858	11, 918	11, 516	5, 918	16, 547
	Hardwoods	385, 846	363, 231	1, 590, 958	93, 792	63, 104	48, 899	204, 016
Lake States:								
Michigan	Softwoods	47, 832	45, 598	175, 058	4, 309	14, 393	4, 863	17, 365
Do	Hardwoods	142, 867	129, 096	585, 354	11, 579	31, 280	17, 633	43, 567
Minnesota	Softwoods	52, 487	50, 417	184, 045	2, 027	2, 418	17, 783	56, 392
Do	Hardwoods	82, 982	73, 761	222, 830	6, 085	6, 820	5, 125	12, 663
North Dakota	Softwoods	136	0	0	0	0	0	0
Do	Hardwoods	1, 147	687	3, 027	36	138	2, 413	3, 620
South Dakota (East)	Softwoods	308	151	320	1	0	257	450
Do	Hardwoods	1, 050	523	1, 571	34	139	893	2, 143
Wisconsin	Softwoods	37, 463	36, 155	120, 259	1, 591	2, 110	1, 439	5, 101
Do	Hardwoods	166, 128	148, 436	535, 824	15, 405	24, 255	105, 957	108, 275
Total	Softwoods	138, 226	132, 321	479, 682	7, 928	18, 921	24, 342	79, 308
	Hardwoods	394, 174	352, 503	1, 348, 606	33, 139	62, 632	132, 021	170, 268
Central States:								
Illinois	Softwoods	185	149	746	15	17	845	1, 220
Do	Hardwoods	42, 879	35, 430	206, 292	5, 425	14, 281	49, 232	174, 386
Indiana	Softwoods	131	126	523	8	11	350	496
Do	Hardwoods	52, 146	49, 308	280, 258	11, 237	54, 028	4, 663	15, 535
Iowa	Softwoods	49	46	212	3	7	269	645
Do	Hardwoods	14, 723	11, 265	60, 138	1, 533	3, 716	37, 289	97, 812
Kansas	Softwoods	13	10	0	0	0	10	0
Do	Hardwoods	7, 899	6, 183	30, 709	579	2, 661	834	2, 321
Kentucky	Softwoods	9, 724	9, 309	35, 278	524	716	1, 234	3, 852
Do	Hardwoods	107, 040	95, 629	516, 802	19, 189	86, 579	15, 369	84, 862
Missouri	Softwoods	4, 117	3, 793	15, 679	182	223	10, 111	14, 266
Do	Hardwoods	103, 552	63, 054	350, 720	4, 428	21, 373	27, 267	58, 189
Nebraska	Softwoods	671	633	1, 770	24	32	599	1, 283
Do	Hardwoods	7, 442	6, 455	41, 587	796	3, 213	1, 649	3, 745
Ohio	Softwoods	1, 811	1, 596	4, 882	90	57	197	550
Do	Hardwoods	93, 817	83, 167	445, 765	20, 673	80, 863	7, 397	39, 712
Total	Softwoods	16, 701	15, 662	59, 090	846	1, 063	13, 615	22, 312
	Hardwoods	429, 498	350, 491	1, 932, 271	63, 860	266, 714	143, 700	476, 562
Total, North	Softwoods	579, 253	506, 158	1, 856, 163	61, 247	64, 578	61, 383	180, 954
	Hardwoods	1, 409, 356	1, 242, 463	5, 496, 798	221, 556	447, 855	341, 670	903, 640
South Atlantic:								
North Carolina	Softwoods	347, 137	321, 822	1, 117, 058	23, 689	33, 565	31, 305	58, 211
Do	Hardwoods	199, 267	174, 615	652, 768	92, 958	99, 247	46, 327	68, 002
South Carolina	Softwoods	283, 931	268, 228	927, 246	17, 030	30, 824	13, 500	41, 376
Do	Hardwoods	121, 448	104, 829	395, 346	26, 522	81, 632	18, 868	36, 664
Virginia	Softwoods	158, 038	148, 620	441, 296	6, 497	8, 995	10, 839	36, 661
Do	Hardwoods	194, 748	173, 578	614, 168	67, 762	27, 806	35, 611	58, 124
Total	Softwoods	789, 106	738, 670	2, 485, 600	47, 216	73, 384	55, 644	136, 248
	Hardwoods	515, 463	453, 022	1, 662, 282	187, 242	208, 685	100, 806	162, 790
East Gulf:								
Florida	Softwoods	246, 870	228, 397	778, 843	13, 736	31, 941	36, 167	123, 216
Do	Hardwoods	38, 363	31, 492	133, 902	10, 474	23, 197	27, 634	62, 601
Georgia	Softwoods	649, 778	610, 079	1, 810, 501	38, 741	191, 453	30, 715	202, 384
Do	Hardwoods	139, 230	122, 801	558, 410	40, 842	69, 960	84, 761	60, 048
Total	Softwoods	896, 648	838, 476	2, 589, 344	52, 477	223, 394	66, 882	325, 600
	Hardwoods	177, 593	154, 293	692, 312	51, 316	93, 157	112, 395	122, 649
Central Gulf:								
Alabama	Softwoods	506, 445	488, 287	1, 971, 548	31, 600	50, 942	1, 600	5, 950
Do	Hardwoods	238, 384	197, 160	632, 696	31, 425	64, 692	57, 111	174, 622
Mississippi	Softwoods	443, 086	428, 354	1, 767, 682	33, 516	57, 551	0	0
Do	Hardwoods	207, 805	175, 523	602, 320	35, 679	79, 120	72, 890	250, 157
Tennessee	Softwoods	28, 745	27, 744	112, 413	1, 958	3, 293	3, 498	8, 294
Do	Hardwoods	132, 598	118, 645	556, 092	35, 965	77, 803	28, 590	61, 705
Total	Softwoods	978, 276	944, 385	3, 851, 643	67, 074	111, 786	5, 098	14, 244
	Hardwoods	578, 787	491, 328	1, 791, 108	103, 069	221, 615	158, 591	486, 484

TABLE 44.—*Roundwood products, logging residues, and other removals from growing stock and sawtimber, by section, region, State and species group, 1970*—Continued

Section, region, and State	Species	Roundwood products			Logging residues		Other removals	
		All sources	Growing stock	Saw-timber	Growing stock	Saw-timber	Growing stock	Saw-timber
		Thousand cubic feet	*Thousand cubic feet*	*Thousand board feet*	*Thousand cubic feet*	*Thousand board feet*	*Tho sand cubic feet*	*Thousand board feet*
West Gulf:								
Arkansas	Softwoods	276, 126	270, 068	1, 313, 452	25, 955	46, 811	3, 391	15, 553
Do	Hardwoods	184, 781	162, 214	655, 181	43, 116	95, 880	115, 364	410, 393
Louisiana	Softwoods	467, 186	455, 883	2, 161, 230	40, 385	71, 116	26, 633	118, 309
Do	Hardwoods	135, 167	112, 837	395, 420	24, 533	54, 427	61, 366	223, 779
Oklahoma	Softwoods	20, 678	20, 202	97, 223	2, 199	3, 997	131	620
Do	Hardwoods	18, 126	15, 172	47, 995	1, 932	3, 801	12, 440	35, 198
Texas	Softwoods	316, 600	307, 981	1, 369, 588	27, 385	36, 470	0	0
Do	Hardwoods	58, 135	47, 707	179, 599	9, 017	14, 712	69, 072	237, 064
Total	Softwoods	1, 080, 590	1, 054, 134	4, 941, 493	95, 924	158, 394	30, 155	134, 482
	Hardwoods	396, 209	337, 930	1, 278, 195	78, 598	168, 820	258, 242	906, 434
Total, South	Softwoods	3, 744, 620	3, 575, 665	13, 868, 080	262, 691	566, 958	157, 779	610, 574
	Hardwoods	1, 668, 052	1, 436, 573	5, 423, 897	420, 225	692, 277	630, 034	1, 678, 357
Pacific Northwest:								
Alaska: Coastal	Softwoods	118, 995	117, 770	746, 213	39, 320	79, 881	0	253, 491
	Hardwoods	0	0	0	0	0	0	0
Oregon:								
Western	Softwoods	1, 166, 746	1, 006, 000	7, 006, 300	172, 000	551, 700	5, 000	33, 000
Do	Hardwoods	18, 032	16, 800	75, 600	4, 200	11, 400	0	0
Eastern	Softwoods	344, 263	330, 880	2, 035, 060	21, 120	62, 940	0	0
Do	Hardwoods	0	0	0	0	0	0	0
Summary	Softwoods	1, 511, 009	1, 336, 880	9, 041, 360	193, 120	614, 640	5, 000	33, 000
Do	Hardwoods	18, 032	16, 800	75, 600	4, 200	11, 400	0	0
Washington:								
Western	Softwoods	1, 143, 940	1, 036, 400	6, 737, 902	158, 600	512, 100	42, 000	242, 998
Do	Hardwoods	48, 466	45, 500	168, 700	11, 500	25, 300	6, 000	20, 000
Eastern	Softwoods	203, 375	197, 200	1, 203, 900	12, 800	39, 100	24, 000	150, 000
Do	Hardwoods	1, 620	1, 600	7, 100	400	1, 100	70	240
Summary	Softwoods	1, 347, 315	1, 233, 600	7, 941, 802	171, 400	551, 200	66, 000	392, 998
Do	Hardwoods	50, 086	47, 100	175, 800	11, 900	26, 400	6, 070	20, 240
Total	Softwoods	2, 977, 319	2, 688, 250	17, 729, 375	403, 840	1, 245, 721	71, 000	679, 489
Do	Hardwoods	68, 118	63, 900	251, 400	16, 100	37, 800	6, 070	20, 240
Pacific Southwest:								
California	Softwoods	827, 480	781, 000	5, 119, 000	92, 000	286, 000	28, 000	176, 000
Do	Hardwoods	16, 243	10, 956	41, 113	13, 479	11, 607	1, 565	3, 280
Hawaii	Softwoods	17	17	119	0	0	0	0
Do	Hardwoods	588	540	2, 693	0	0	1, 600	8, 000
Total	Softwoods	827, 497	781, 017	5, 119, 119	92, 000	286, 000	28, 000	176, 000
Do	Hardwoods	16, 831	11, 496	43, 806	13, 479	11, 607	3, 165	11, 280
Total, Pacific Coast	Softwoods	3, 804, 816	3, 469, 267	22, 848, 494	495, 840	1, 531, 721	99, 000	855, 489
Do	Hardwoods	84, 949	75, 396	295, 206	29, 579	49, 407	9, 235	31, 520
Northern Rocky Mountain:								
Idaho	Softwoods	325, 698	316, 395	1, 965, 218	37, 175	117, 283	3, 640	22, 923
Do	Hardwoods	253	41	252	5	15	0	4
Montana	Softwoods	279, 533	275, 279	1, 647, 355	44, 009	135, 801	5, 091	31, 510
Do	Hardwoods	27	26	164	5	14	1	12
South Dakota (West)	Softwoods	15, 124	14, 888	85, 245	581	733	186	1, 113
Do	Hardwoods	0	0	0	0	0	0	0
Wyoming	Softwoods	33, 685	32, 244	182, 979	2, 469	3, 862	1, 442	8, 846
Do	Hardwoods	0	0	0	0	0	0	0
Total	Softwoods	654, 040	638, 806	3, 880, 797	84, 234	257, 679	10, 359	64, 392
Do	Hardwoods	280	67	416	10	29	1	16
Southern Rocky Mountain:								
Arizona	Softwoods	86, 985	78, 463	466, 278	8, 537	23, 372	557	1, 481
Do	Hardwoods	7, 194	170	546	14	22	0	7
Colorado	Softwoods	52, 257	48, 629	294, 377	4, 623	12, 562	4, 237	25, 874
Do	Hardwoods	1, 885	1, 264	7, 417	130	336	110	653
Nevada	Softwoods	572	0	0	0	0	10	63
Do	Hardwoods	0	0	0	0	0	0	0
New Mexico	Softwoods	46, 790	38, 556	241, 701	4, 689	15, 380	355	2, 233
Do	Hardwoods	802	430	2, 591	50	164	6	34
Utah	Softwoods	11, 955	11, 045	65, 161	792	1, 777	423	2, 631
Do	Hardwoods	436	425	111	31	3	24	6
Total	Softwoods	198, 559	176, 693	1, 067, 517	18, 641	53, 091	5, 582	32, 282
Do	Hardwoods	10, 317	2, 289	10, 665	225	525	140	700
Total, Rocky Mountain	Softwoods	852, 599	815, 499	4, 948, 314	102, 875	310, 770	15, 941	96, 674
Do	Hardwoods	10, 597	2, 356	11, 081	235	554	141	716
Total, all regions	Softwoods	8, 981, 288	8, 366, 589	43, 521, 051	922, 653	2, 474, 027	334, 103	1, 743, 691
Do	Hardwoods	3, 172, 954	2, 756, 788	11, 226, 982	671, 595	1, 190, 093	981, 080	2, 614, 233

TABLE 45 —*Area of commercial timberland by ownership, forest type, stand size, and site, 1970* [1]*—North*

[Thousand acres]

NATIONAL FOREST

Stand size and site	White-red-jack pine	Spruce-fir	Longleaf-slash pine	Loblolly-shortleaf pine	Oak-pine	Oak-hickory	Oak-gum-cypress	Elm-ash-cottonwood	Maple-beech-birch	Aspen-birch	Non-stocked	Total
Sawtimber:												
120+	7	17	0	19	7	26	0	0	70	0	0	147
85 to 120	5	46	0	12	15	85	1	4	199	5	0	375
50 to 85	177	122	0	76	104	626	1	47	744	142	0	2,042
20 to 50	50	70	0	1	2	220	0	9	135	32	0	522
Total	241	256	0	109	129	957	2	60	1,150	180	0	3,087
Poletimber:												
120+	1	0	0	1	1	14	0	0	33	1	0	52
85 to 120	13	27	0	6	2	36	0	4	188	26	0	304
50 to 85	407	444	0	71	100	428	0	61	678	1,076	0	3,267
20 to 50	113	314	0	5	2	487	0	30	108	265	0	1,327
Total	534	786	0	83	105	966	0	96	1,009	1,369	0	4,951
Seedlings and saplings:												
120+	4	13	0	0	0	0	0	0	7	0	0	25
85 to 120	11	15	0	2	0	2	0	2	42	11	5	93
50 to 85	389	206	0	86	28	92	0	13	225	303	235	1,580
20 to 50	77	154	0	47	22	168	0	14	64	59	110	719
Total	483	388	0	136	51	263	0	30	340	374	351	2,418
All size classes:												
120+	13	30	0	20	8	40	0	1	111	1	0	225
85 to 120	30	88	0	20	17	124	1	11	431	43	5	773
50 to 85	973	772	0	234	233	1,146	1	122	1,648	1,522	235	6,890
20 to 50	241	539	0	54	27	875	0	53	308	356	110	2,568
Total	1,259	1,431	0	329	286	2,187	2	187	2,499	1,923	351	10,458
OTHER PUBLIC												
Sawtimber:												
120+	44	23	0	0	9	152	1	9	41	2	0	284
85 to 120	72	42	0	23	30	255	4	47	110	37	0	624
50 to 85	168	79	0	19	39	708	24	268	465	190	0	1,964
20 to 50	125	195	0	1	15	300	1	262	474	111	0	1,486
Total	411	341	0	43	94	1,417	30	587	1,093	341	0	4,360
Poletimber:												
120+	62	86	0	2	5	65	0	20	33	7	0	281
85 to 120	76	208	0	43	14	297	2	69	144	267	0	1,121
50 to 85	198	690	0	38	71	779	16	305	489	1,496	0	4,084
20 to 50	448	960	0	3	24	531	1	503	657	1,290	0	4,423
Total	785	1,945	0	87	114	1,673	20	898	1,325	3,060	0	9,911
Seedlings and saplings:												
120+	23	39	0	0	2	55	0	6	10	1	14	153
85 to 120	54	91	0	34	9	90	2	24	37	81	69	493
50 to 85	170	552	0	25	33	283	12	207	173	769	587	2,814
20 to 50	284	875	0	1	14	270	0	304	292	838	839	3,721
Total	532	1,558	0	60	58	699	14	542	514	1,691	1,510	7,182
All size classes:												
120+	130	149	0	2	16	273	1	35	86	10	14	719
85 to 120	202	342	0	100	53	643	8	140	292	386	69	2,239
50 to 85	537	1,321	0	82	144	1,771	52	781	1,128	2,456	587	8,863
20 to 50	858	2,032	0	5	54	1,101	3	1,070	1,424	2,239	839	9,630
Total	1,729	3,846	0	190	268	3,790	65	2,028	2,932	5,092	1,510	21,453
FOREST INDUSTRY												
Sawtimber:												
120+	158	357	0	6	27	91	2	166	169	48	0	1,029
85 to 120	150	566	0	32	22	248	11	158	202	127	0	1,518
50 to 85	262	607	0	11	26	241	7	415	567	208	0	2,348
20 to 50	237	426	0	4	44	234	2	296	1,215	72	0	2,534
Total	809	1,958	0	54	120	816	22	1,037	2,154	456	0	7,431
Poletimber:												
120+	53	156	0	3	17	55	2	88	76	44	0	497
85 to 120	206	719	0	20	26	190	5	284	240	211	0	1,905
50 to 85	260	503	0	10	31	171	3	220	369	442	0	2,012
20 to 50	120	385	0	3	24	163	2	230	488	322	0	1,740
Total	640	1,764	0	37	99	580	13	824	1,174	1,020	0	6,155

See footnote at end of table.

TABLE 45—*Area of commercial timberland by ownership, forest type, stand size, and site, 1970* [1]—*North*—Continued

[Thousand acres]

FOREST INDUSTRY—Continued

Stand size and site	White red-jack pine	Spruce-fir	Longleaf-slash pine	Loblolly-shortleaf pine	Oak-pine	Oak-hickory	Oak-gum-cypress	Elm-ash-cottonwood	Maple-beech-birch	Aspen-birch	Non-stocked	Total
Seedlings and saplings:												
120+	22	122	0	3	0	15	0	36	31	38	1	269
85 to 120	97	339	0	12	26	81	6	133	120	63	6	888
50 to 85	162	343	0	6	14	83	3	219	175	290	35	1,333
20 to 50	88	410	0	2	17	159	3	140	382	190	90	1,485
Total	370	1,215	0	23	57	339	13	530	709	583	133	3,976
All size classes:												
120+	234	636	0	12	45	162	4	291	276	131	1	1,796
85 to 120	454	1,625	0	65	74	520	23	577	563	402	6	4,311
50 to 85	685	1,454	0	28	72	496	14	855	1,112	940	35	5,694
20 to 50	447	1,222	0	9	85	557	7	668	2,086	585	90	5,760
Total	1,820	4,938	0	115	277	1,735	50	2,391	4,038	2,060	133	17,563
FARM AND MISCELLANEOUS PRIVATE												
Sawtimber:												
120+	343	294	0	30	112	710	10	247	578	30	0	2,359
85 to 120	734	558	0	685	542	6,611	225	1,239	1,759	292	0	12,649
50 to 85	1,112	668	0	383	312	7,555	247	3,147	3,505	494	0	17,426
20 to 50	663	493	0	69	265	5,051	146	2,243	2,516	186	0	11,635
Total	2,854	2,014	0	1,168	1,233	19,929	630	6,877	8,360	1,004	0	44,071
Poletimber:												
120+	211	345	0	18	62	679	4	326	394	148	0	2,190
85 to 120	413	525	0	490	269	4,126	116	997	1,416	908	0	9,265
50 to 85	952	916	0	278	396	5,674	118	1,889	2,213	2,342	0	14,780
20 to 50	535	1,229	0	50	242	4,701	60	1,815	2,654	1,610	0	12,902
Total	2,113	3,016	0	837	971	15,182	299	5,029	6,678	5,009	0	39,137
Seedlings and saplings:												
120+	176	482	0	24	79	742	1	250	432	160	130	2,480
85 to 120	536	900	0	436	430	3,388	142	967	1,312	1,297	697	10,107
50 to 85	716	1,041	0	274	254	4,325	124	1,913	1,978	2,447	2,288	15,363
20 to 50	705	1,230	0	45	284	4,255	46	2,325	2,424	1,489	4,460	17,265
Total	2,134	3,653	0	780	1,048	12,711	314	5,457	6,148	5,393	7,576	45,217
All size classes:												
120+	731	1,121	0	73	255	2,133	16	824	1,405	338	130	7,029
85 to 120	1,684	1,984	0	1,612	1,242	14,126	484	3,204	4,488	2,498	697	32,022
50 to 85	2,781	2,625	0	935	963	17,554	489	6,950	7,697	5,284	2,288	47,570
20 to 50	1,905	2,952	0	165	792	14,008	253	6,384	7,594	3,286	4,460	41,803
Total	7,101	8,683	0	2,787	3,253	47,823	1,244	17,364	21,186	11,407	7,576	128,426
ALL OWNERSHIPS												
Sawtimber:												
120+	554	693	0	56	156	981	13	423	860	81	0	3,820
85 to 120	963	1,213	0	753	610	7,201	241	1,449	2,272	463	0	15,167
50 to 85	1,720	1,478	0	490	483	9,131	280	3,878	5,283	1,035	0	23,781
20 to 50	1,076	1,185	0	76	328	5,807	150	2,811	4,341	402	0	16,179
Total	4,315	4,570	0	1,376	1,578	23,120	685	8,562	12,757	1,982	0	58,949
Poletimber:												
120+	328	587	0	25	85	814	6	435	537	200	0	3,021
85 to 120	709	1,480	0	559	311	4,651	124	1,355	1,990	1,413	0	12,596
50 to 85	1,817	2,553	0	398	599	7,053	138	2,477	3,750	5,357	0	24,145
20 to 50	1,218	2,890	0	62	293	5,884	64	2,580	3,909	3,488	0	20,392
Total	4,073	7,512	0	1,046	1,291	18,403	333	6,849	10,186	10,459	0	60,156
Seedlings and saplings:												
120+	226	656	0	27	81	813	1	293	481	200	146	2,929
85 to 120	699	1,346	0	485	465	3,562	150	1,128	1,514	1,453	777	11,583
50 to 85	1,439	2,142	0	391	330	4,784	139	2,353	2,553	3,810	3,146	21,091
20 to 50	1,156	2,670	0	96	339	4,852	49	2,785	3,163	2,577	5,500	23,191
Total	3,521	6,816	0	999	1,216	14,012	341	6,559	7,712	8,041	9,571	58,795
All size classes:												
120+	1,109	1,937	0	108	324	2,609	21	1,152	1,879	481	146	9,771
85 to 120	2,371	4,040	0	1,798	1,387	15,414	516	3,933	5,776	3,329	777	39,347
50 to 85	4,977	6,174	0	1,280	1,413	20,968	558	8,709	11,586	10,204	3,146	69,019
20 to 50	3,452	6,746	0	235	960	16,543	265	8,176	11,414	6,468	5,500	59,763
Total	11,910	18,899	0	3,422	4,085	55,536	1,361	21,971	30,657	20,484	9,571	177,901

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[1] Data may not add to totals because of truncating. Zeros indicate no data or negligible amounts.

TABLE 46.—*Area of commercial timberland by ownership, forest type, stand size, and site, 1970* [1]*—South*

[Thousand acres]

NATIONAL FOREST

Stand size and site	White-red-jack pine	Spruce-fir	Longleaf-slash pine	Loblolly-shortleaf pine	Oak-pine	Oak-hickory	Oak-gum-cypress	Elm-ash-cottonwood	Maple-beech-birch	Aspen-birch	Non-stocked	Total
Sawtimber:												
120+	18	0	24	259	67	54	46	0	1	0	0	472
85 to 120	7	0	144	736	224	309	84	8	15	0	0	1,530
50 to 85	30	2	262	781	440	908	87	12	44	0	0	2,570
20 to 50	5	1	88	194	185	481	69	0	15	0	0	1,041
Total	61	4	519	1,971	917	1,754	287	21	76	0	0	5,614
Poletimber:												
120+	1	0	0	32	16	16	11	0	0	0	0	77
85 to 120	0	0	44	124	59	79	11	0	3	0	0	323
50 to 85	0	0	108	386	266	746	30	2	11	0	0	1,552
20 to 50	0	0	55	158	92	498	15	0	10	0	0	831
Total	1	0	209	701	434	1,339	69	2	25	0	0	2,784
Seedlings and saplings:												
120+	0	0	0	8	2	0	7	0	0	0	0	18
85 to 120	1	0	54	109	97	85	15	0	0	0	0	363
50 to 85	0	0	128	226	230	429	42	0	5	0	41	1,104
20 to 50	1	0	46	159	168	436	14	0	4	0	48	878
Total	2	0	229	503	498	951	79	0	9	0	89	2,365
All size classes:												
120+	19	0	24	300	85	70	66	0	1	0	0	568
85 to 120	8	0	244	970	380	474	111	8	19	0	0	2,217
50 to 85	30	2	499	1,393	937	2,083	160	15	61	0	41	5,228
20 to 50	6	2	190	511	446	1,416	98	0	30	0	48	2,750
Total	65	4	958	3,176	1,850	4,045	436	24	112	0	89	10,764

OTHER PUBLIC

Stand size and site	White-red-jack pine	Spruce-fir	Longleaf-slash pine	Loblolly-shortleaf pine	Oak-pine	Oak-hickory	Oak-gum-cypress	Elm-ash-cottonwood	Maple-beech-birch	Aspen-birch	Non-stocked	Total
Sawtimber:												
120+	0	0	21	89	28	15	145	21	0	0	0	322
85 to 120	0	0	115	220	103	122	259	9	0	0	0	830
50 to 85	0	0	202	215	190	374	208	17	14	0	0	1,224
20 to 50	0	0	113	76	101	89	89	5	0	0	0	474
Total	0	0	452	601	424	602	702	53	14	0	0	2,851
Poletimber:												
120+	4	0	6	18	10	7	32	10	0	0	0	89
85 to 120	0	0	41	117	42	56	40	6	0	0	0	304
50 to 85	0	0	88	131	130	223	76	10	0	0	0	660
20 to 50	0	0	57	89	64	168	43	4	0	0	0	427
Total	4	0	193	356	247	455	193	32	0	0	0	1,482
Seedlings and saplings:												
120+	0	0	4	0	2	0	33	8	0	0	0	49
85 to 120	0	0	41	88	64	48	81	0	0	0	11	335
50 to 85	0	0	176	128	160	312	81	11	0	0	106	978
20 to 50	0	0	99	81	93	276	23	6	0	0	236	818
Total	0	0	322	299	320	637	219	26	0	0	354	2,181
All sizes classes:												
120+	4	0	32	108	40	22	211	41	0	0	0	461
85 to 120	0	0	197	425	210	227	381	15	0	0	11	1,470
50 to 85	0	0	468	475	481	911	366	39	14	0	106	2,863
20 to 50	0	0	269	247	259	534	156	16	0	0	236	1,720
Total	4	0	968	1,257	991	1,695	1,115	112	14	0	354	6,514

FOREST INDUSTRY

Stand size and site	White-red-jack pine	Spruce-fir	Longleaf-slash pine	Loblolly-shortleaf pine	Oak-pine	Oak-hickory	Oak-gum-cypress	Elm-ash-cottonwood	Maple-beech-birch	Aspen-birch	Non-stocked	Total
Sawtimber:												
120+	4	0	142	1,095	500	224	386	93	0	0	0	2,447
85 to 120	0	0	688	2,784	1,096	629	1,644	79	4	0	0	6,926
50 to 85	4	0	704	1,768	805	697	1,161	92	8	0	0	5,242
20 to 50	3	0	229	290	113	203	231	9	0	0	0	1,080
Total	12	0	1,764	5,938	2,515	1,756	3,422	274	12	0	0	15,697
Poletimber:												
120+	0	0	65	99	101	70	88	11	4	0	0	440
85 to 120	0	0	514	635	269	277	326	26	0	0	0	2,049
50 to 85	0	0	653	1,038	587	766	478	21	4	0	0	3,549
20 to 50	0	0	213	220	145	316	108	0	0	0	0	1,004
Total	0	0	1,447	1,993	1,103	1,431	1,001	59	8	0	0	7,044

See footnote at end of table.

TABLE 46.—*Area of commercial timberland by ownership, forest type, stand size, and site, 1970* [1]—*South*—Continued

[Thousand acres]

FOREST INDUSTRY—Continued

Stand size and site	White-red-jack pine	Spruce-fir	Long-leaf-slash pine	Loblolly-shortleaf pine	Oak-pine	Oak-hickory	Oak-gum-cypress	Elm-ash-cotton-wood	Maple-beech-birch	Aspen-birch	Non-stocked	Total
Seedlings and saplings:												
120+	0	0	55	219	94	68	84	34	0	0	25	583
85 to 120	4	0	678	933	529	328	264	9	0	0	73	2, 821
50 to 85	0	0	1, 718	2, 056	1, 304	953	401	25	0	0	317	6, 776
20 to 50	0	0	450	591	359	470	164	3	0	0	362	2, 403
Total	4	0	2, 903	3, 800	2, 288	1, 820	915	73	0	0	778	12, 583
All size classes:												
120+	4	0	262	1, 414	696	364	559	139	4	0	25	3, 470
85 to 120	4	0	1, 881	4, 353	1, 896	1, 235	2, 234	115	4	0	73	11, 798
50 to 85	4	0	3, 076	4, 862	2, 697	2, 417	2, 041	138	12	0	317	15,568
20 to 50	3	0	894	1, 101	617	991	503	13	0	0	362	4,488
Total	16	0	6, 115	11, 731	5, 907	5, 008	5, 339	407	21	0	778	35,325

FARM AND MISCELLANEOUS PRIVATE

Stand size and site	White-red-jack pine	Spruce-fir	Long-leaf-slash pine	Loblolly-shortleaf pine	Oak-pine	Oak-hickory	Oak-gum-cypress	Elm-ash-cotton-wood	Maple-beech-birch	Aspen-birch	Non-stocked	Total
Sawtimber:												
120+	43	0	290	1, 940	1, 155	777	974	291	8	0	0	5, 482
85 to 120	14	0	939	4, 679	2, 635	3, 048	6, 659	529	27	0	0	18, 532
50 to 85	34	4	1, 434	4, 418	3, 029	6, 684	3, 937	312	125	0	0	19, 981
20 to 50	3	0	686	541	751	2, 702	1, 096	81	18	0	0	5, 881
Total	96	4	3, 350	11, 579	7, 572	13, 212	12, 668	1, 214	179	0	0	49, 877
Poletimber:												
120+	15	0	94	534	282	394	303	106	3	0	0	1, 734
85 to 120	3	0	795	2, 140	1, 300	2, 266	2, 043	181	13	0	0	8,745
50 to 85	0	4	1, 086	3, 913	2, 634	7, 322	2, 159	167	92	0	0	17, 381
20 to 50	4	0	381	860	903	4, 171	592	61	4	0	0	6, 979
Total	23	4	2, 357	7, 450	5, 121	14, 155	5, 097	517	114	0	0	34, 840
Seedings and saplings:												
120+	24	0	112	599	369	278	281	87	0	0	11	1, 762
85 to 120	9	0	1, 484	3, 698	1, 739	2, 027	1, 375	185	0	0	169	10, 688
50 to 85	19	0	2, 267	8, 002	5, 650	9, 051	2, 255	145	16	0	1, 195	28, 604
20 to 50	0	0	700	1, 914	1, 739	6, 850	699	62	24	0	2, 173	14, 164
Total	52	0	4, 564	14, 214	9, 499	18, 207	4, 610	480	40	0	3, 549	55, 219
All size classes:												
120+	83	0	496	3, 074	1, 807	1, 449	1, 558	484	12	0	11	8, 978
85 to 120	26	0	3, 219	10, 518	5, 675	7, 341	10, 077	896	40	0	169	37, 966
50 to 85	53	8	4, 788	16, 334	11, 314	23, 059	8, 352	625	234	0	1, 195	65, 967
20 to 50	7	0	1, 768	3, 315	3, 394	13, 724	2, 388	205	47	0	2, 173	27, 025
Total	171	8	10, 272	33, 243	22, 192	45, 575	22, 377	2, 212	334	0	3, 549	139, 938

ALL OWNERSHIPS

Stand size and site	White-red-jack pine	Spruce-fir	Long-leaf-slash pine	Loblolly-shortleaf pine	Oak-pine	Oak-hickory	Oak-gum-cypress	Elm-ash-cotton-wood	Maple-beech-birch	Aspen-birch	Non-stocked	Total
Sawtimber:												
120+	66	0	478	3, 385	1, 751	1, 071	1, 553	407	9	0	0	8, 724
85 to 120	21	0	1, 887	8, 420	4, 059	4, 110	8, 646	626	47	0	0	27,820
50 to 85	69	7	2, 603	7, 183	4, 465	8, 665	5, 395	435	193	0	0	29, 018
20 to 50	13	1	1, 116	1, 101	1, 151	3, 477	1, 486	96	33	0	0	8, 477
Total	170	8	6, 086	20, 090	11, 428	17, 325	17, 082	1, 564	284	0	0	74, 041
Poletimber:												
120+	21	0	165	684	409	488	435	128	7	0	0	2, 340
85 to 120	3	0	1, 396	3, 017	1, 672	2, 680	2, 421	214	17	0	0	11, 423
50 to 85	0	4	1, 937	5, 469	3, 618	9, 058	2, 744	202	108	0	0	23, 144
20 to 50	4	0	708	1, 329	1, 205	5, 154	759	66	15	0	0	9, 242
Total	28	4	4, 207	10, 501	6, 906	17, 381	6, 361	611	148	0	0	46, 151
Seedlings and saplings:												
120+	24	0	172	827	469	346	407	130	0	0	36	2, 413
85 to 120	14	0	2, 259	4, 830	2, 431	2, 488	1, 736	195	0	0	254	14, 209
50 to 85	19	0	4, 292	10, 413	7, 346	10, 747	2, 780	182	21	0	1, 660	37, 463
20 to 50	1	0	1, 296	2, 745	2, 360	8, 035	901	72	28	0	2, 820	18, 263
Total	58	0	8, 020	18, 817	12, 607	21, 617	5, 825	580	50	0	4, 771	72, 349
All size classes:												
120+	111	0	816	4, 898	2, 630	1, 906	2, 396	665	17	0	36	13, 478
85 to 120	39	0	5, 543	16, 268	8, 163	9, 279	12, 804	1, 035	64	0	254	53, 452
50 to 85	88	11	8, 833	23, 066	15, 430	28, 471	10, 920	820	323	0	1, 660	89, 626
20 to 50	18	2	3, 122	5, 176	4, 718	16, 667	3, 146	235	77	0	2, 820	35, 984
Total	257	13	18, 314	49, 409	30, 942	56, 324	29, 268	2, 756	482	0	4, 771	192, 542

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[1] Data may not add to totals because of truncating. Zeros indicate no data or negligible amounts.

TABLE 47.—*Area of commercial timberland by ownership, forest type, stand size, and site, 1970* [1]*—Rocky Mountains* [2]

[Thousand acres]

Stand size and site	Douglas-fir	Ponderosa pine	Western white pine	Fir-spruce	Hemlock-Sitka spruce	Larch	Lodgepole pine	Redwood	Western hardwoods	Nonstocked	Total
NATIONAL FOREST											
Sawtimber:											
120+	651	158	225	464	95	336	256	0	18	0	2,206
85 to 120	927	216	53	1,007	88	195	618	0	28	0	3,135
50 to 85	1,532	1,238	19	1,699	69	149	796	0	163	0	5,668
20 to 50	2,220	3,738	1	2,572	70	14	1,556	0	436	0	10,609
Total	5,332	5,350	300	5,743	323	695	3,227	0	646	0	21,620
Poletimber:											
120+	176	45	80	96	23	199	337	0	43	0	1,001
85 to 120	293	13	15	165	26	97	856	0	130	0	1,599
50 to 85	185	70	8	190	5	37	771	0	193	0	1,463
20 to 50	256	600	0	401	6	1	1,387	0	745	0	3,399
Total	911	729	104	854	62	335	3,353	0	1,112	0	7,462
Seedlings and saplings:											
120+	106	7	43	101	10	108	145	0	0	218	741
85 to 120	228	18	12	205	10	58	311	0	9	255	1,109
50 to 85	131	63	4	154	11	9	189	0	64	325	953
20 to 50	170	345	0	289	10	10	618	0	239	1,168	2,853
Total	636	434	61	751	41	186	1,264	0	314	1,967	5,657
All size classes:											
120+	934	210	349	663	128	643	739	0	61	218	3,949
85 to 120	1,449	247	81	1,378	125	351	1,785	0	168	255	5,844
50 to 85	1,849	1,372	33	2,044	85	196	1,758	0	421	325	8,085
20 to 50	2,647	4,683	1	3,263	87	25	3,562	0	1,421	1,168	16,861
Total	6,880	6,513	466	7,349	426	1,217	7,845	0	2,073	1,967	34,740
OTHER PUBLIC											
Sawtimber:											
120+	41	12	27	54	9	33	0	0	1	0	180
85 to 120	155	187	30	162	64	21	8	0	8	0	638
50 to 85	537	802	0	313	29	57	46	0	16	0	1,803
20 to 50	572	1,722	0	203	10	18	174	0	155	0	2,855
Total	1,306	2,725	58	733	113	131	228	0	182	0	5,478
Poletimber:											
120+	0	0	0	0	0	0	0	0	0	0	0
85 to 120	17	12	0	10	0	0	0	0	0	0	39
50 to 85	20	12	0	11	7	14	55	0	7	0	128
20 to 50	202	205	0	17	6	13	267	0	258	0	971
Total	240	229	0	39	13	27	323	0	265	0	1,139
Seedlings and saplings:											
120+	3	4	13	12	0	0	0	0	0	0	34
85 to 120	28	0	0	13	6	0	0	0	0	0	48
50 to 85	17	21	0	22	6	2	0	0	4	15	91
20 to 50	44	67	0	19	0	0	88	0	46	123	389
Total	94	93	13	67	13	2	88	0	52	139	563
All size classes:											
120+	45	16	40	67	9	33	0	0	2	0	214
85 to 120	200	199	30	186	71	21	8	0	8	0	726
50 to 85	575	836	0	347	43	74	101	0	29	15	2,024
20 to 50	819	1,994	0	239	16	31	530	0	460	123	4,215
Total	1,641	3,048	71	840	140	161	639	0	500	139	7,181
FOREST INDUSTRY											
Sawtimber:											
120+	69	9	30	36	27	45	6	0	0	0	225
85 to 120	57	71	16	103	31	36	1	0	8	0	325
50 to 85	219	261	11	164	45	71	4	0	4	0	782
20 to 50	144	244	0	18	30	22	14	0	3	0	478
Total	491	586	58	322	134	175	26	0	17	0	1,812
Poletimber:											
120+	0	0	0	0	0	0	0	0	0	0	0
85 to 120	1	1	4	1	0	0	0	0	0	0	8
50 to 85	3	4	1	9	0	20	20	0	1	0	61
20 to 50	51	34	0	2	0	0	79	0	7	0	175
Total	55	40	6	13	0	20	99	0	9	0	245

See footnotes at end of table.

TABLE 47.—*Area of commercial timberland by ownership, forest type, stand size, and site, 1970* [1]—*Rocky Mountains* [2]—Con.

[Thousand acres]

FOREST INDUSTRY—Continued

Stand size and site	Douglas-fir	Ponderosa pine	Western white pine	Fir-spruce	Hemlock-Sitka spruce	Larch	Lodgepole pine	Redwood	Western hardwoods	Nonstocked	Total
Seedling and saplings:											
120+	1	2	0	10	0	0	0	0	0	0	14
85 to 120	9	0	0	26	0	0	0	0	0	0	35
50 to 85	19	4	0	16	7	3	0	0	1	24	77
20 to 50	2	14	0	0	0	0	18	0	1	11	49
Total	32	21	0	54	7	3	18	0	2	35	176
All size classes:											
120+	70	11	30	47	27	45	6	0	0	0	239
85 to 120	67	72	20	131	31	36	1	0	8	0	370
50 to 85	242	270	12	190	52	95	24	0	7	24	920
20 to 50	198	294	0	21	30	22	112	0	12	11	703
Total	579	648	64	390	142	199	144	0	28	35	2,233

FARM AND MISCELLANEOUS PRIVATE

Stand size and site	Douglas-fir	Ponderosa pine	Western white pine	Fir-spruce	Hemlock-Sitka spruce	Larch	Lodgepole pine	Redwood	Western hardwoods	Nonstocked	Total
Sawtimber:											
120+	44	9	7	43	30	108	0	0	4	0	247
85 to 120	244	133	13	157	41	60	11	0	64	0	725
50 to 85	811	639	0	441	38	117	95	0	94	0	2,238
20 to 50	1,012	2,351	0	359	29	32	261	0	385	0	4,431
Total	2,112	3,132	20	1,000	140	318	368	0	549	0	7,644
Poletimber:											
120+	0	10	0	7	0	0	6	0	0	0	24
85 to 120	9	5	0	6	7	9	12	0	0	0	50
50 to 85	29	16	0	18	0	86	124	0	37	0	312
20 to 50	478	849	0	82	6	0	630	0	847	0	2,894
Total	517	881	0	114	13	96	774	0	884	0	3,281
Seedling and saplings:											
120+	1	25	0	10	18	0	0	0	5	9	70
85 to 120	16	0	0	1	7	8	17	0	0	20	71
50 to 85	80	37	9	52	0	30	0	0	16	87	314
20 to 50	55	166	0	40	6	0	151	0	214	411	1,047
Total	154	229	9	105	32	39	169	0	235	528	1,503
All size classes:											
120+	45	45	7	60	49	108	6	0	9	9	342
85 to 120	271	138	13	165	56	78	41	0	64	20	848
50 to 85	921	692	9	511	38	234	220	0	148	87	2,865
20 to 50	1,546	3,366	0	482	42	32	1,044	0	1,447	411	8,373
Total	2,785	4,243	29	1,220	186	454	1,312	0	1,670	528	12,429

ALL OWNERSHIPS

Stand size and site	Douglas-fir	Ponderosa pine	Western white pine	Fir-spruce	Hemlock-Sitka spruce	Larch	Lodgepole pine	Redwood	Western hardwoods	Nonstocked	Total
Sawtimber:											
120+	807	189	291	598	162	524	262	0	24	0	2,860
85 to 120	1,385	608	113	1,431	225	313	638	0	110	0	4,826
50 to 85	3,101	2,941	31	2,617	182	396	943	0	280	0	10,493
20 to 50	3,949	8,056	1	3,152	141	87	2,005	0	980	0	18,375
Total	9,243	11,795	437	7,799	712	1,321	3,850	0	1,395	0	36,555
Poletimber:											
120+	176	56	80	104	23	199	343	0	43	0	1,025
85 to 120	321	31	20	183	34	107	869	0	130	0	1,698
50 to 85	239	103	10	230	13	158	971	0	239	0	1,965
20 to 50	988	1,689	0	505	18	14	2,365	0	1,858	0	7,439
Total	1,725	1,880	110	1,022	89	478	4,549	0	2,272	0	12,129
Seedlings and saplings:											
120+	112	39	56	135	28	108	145	0	5	227	859
85 to 120	282	18	12	247	24	66	328	0	9	275	1,265
50 to 85	248	127	13	245	24	46	189	0	87	453	1,436
20 to 50	273	593	0	350	17	10	877	0	502	1,715	4,338
Total	916	778	83	978	94	232	1,540	0	604	2,671	7,900
All size classes:											
120+	1,096	284	428	837	214	832	751	0	73	227	4,746
85 to 120	1,989	658	146	1,861	284	487	1,836	0	250	275	7,789
50 to 85	3,589	3,171	55	3,093	221	600	2,104	0	606	453	13,895
20 to 50	5,211	10,339	1	4,007	177	111	5,248	0	3,341	1,715	30,153
Total	11,885	14,454	631	9,800	896	2,032	9,940	0	4,272	2,671	56,585

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[1] Data may not add to totals because of truncating. Zeros indicate no data or negligible amounts.
[2] See footnote 2, table 3.

TABLE 48.—*Area of commercial timberland by ownership, forest type, stand size, and site, 1970* [1]*—Pacific Coast*

[Thousand acres]

Stand size and site	Douglas-fir	Ponderosa pine	Western white pine	Fir-spruce	Hemlock-Sitka spruce	Larch	Lodgepole pine	Redwood	Western hardwoods	Nonstocked	Total
NATIONAL FOREST											
Sawtimber:											
120+	1,644	578	20	1,140	1,827	39	9	1	233	0	5,492
85 to 120	1,279	1,568	23	1,309	2,006	52	199	1	286	0	6,724
50 to 85	2,711	3,155	24	1,940	960	115	361	2	293	0	9,562
20 to 50	421	1,078	45	492	129	33	41	0	33	0	2,273
Total	6,055	6,379	112	4,881	4,924	239	610	4	846	0	24,052
Poletimber:											
120+	142	21	1	109	98	19	18	0	40	0	450
85 to 120	111	123	1	114	82	29	483	0	34	0	979
50 to 85	330	362	0	239	52	35	575	0	67	0	1,660
20 to 50	78	149	0	67	4	10	52	0	4	0	365
Total	661	655	2	531	238	93	1,128	0	146	0	3,456
Seedlings and saplings:											
120+	192	31	6	84	181	33	11	0	55	158	752
85 to 120	123	124	55	103	134	44	106	0	53	253	997
50 to 85	201	266	5	129	56	45	156	0	54	381	1,294
20 to 50	43	86	2	38	13	19	21	0	18	120	362
Total	559	507	68	356	386	141	294	0	181	914	3,407
All size classes:											
120+	1,978	630	27	1,334	2,107	91	38	1	329	158	6,695
85 to 120	1,513	1,815	79	1,527	2,224	125	788	1	375	253	8,701
50 to 85	3,242	3,783	29	2,309	1,069	195	1,092	2	414	381	12,518
20 to 50	542	1,313	47	598	147	62	114	0	55	120	3,001
Total	7,275	7,541	182	5,769	5,549	473	2,032	4	1,175	914	30,915
OTHER PUBLIC											
Sawtimber:											
120+	1,243	63	0	223	579	421	0	27	374	0	2,515
85 to 120	498	248	0	79	193	21	0	0	117	0	1,157
50 to 85	774	498	0	107	235	43	94	0	121	0	1,873
20 to 50	83	102	0	7	25	4	20	0	17	0	259
Total	2,598	911	0	418	1,033	72	114	27	630	0	5,805
Poletimber:											
120+	162	0	0	0	88	0	0	0	181	0	432
85 to 120	67	27	0	16	22	16	1	0	27	0	177
50 to 85	157	80	0	32	8	19	116	0	26	0	438
20 to 50	9	43	0	0	0	0	16	0	5	0	73
Total	395	150	0	48	119	35	133	0	239	0	1,121
Seedlings and saplings:											
120+	320	30	0	45	175	0	0	0	194	423	1,188
85 to 120	99	40	0	16	17	5	3	0	12	42	234
50 to 85	183	43	0	19	37	0	52	0	61	147	543
20 to 50	32	18	0	1	1	0	16	0	16	69	153
Total	634	131	0	83	231	5	71	0	283	681	2,120
All size classes:											
120+	1,725	93	0	269	843	4	0	27	749	423	4,135
85 to 120	664	315	0	111	233	42	4	0	156	42	1,569
50 to 85	1,114	621	0	160	281	62	262	0	208	147	2,856
20 to 50	124	163	0	8	26	4	52	0	38	69	486
Total	3,627	1,192	0	550	1,384	112	318	27	1,153	681	9,046
FOREST INDUSTRY											
Sawtimber:											
120+	1,625	318	0	275	969	0	0	382	655	0	4,224
85 to 120	410	419	8	161	120	6	22	37	289	0	1,472
50 to 85	394	597	0	152	125	0	165	15	194	0	1,642
20 to 50	23	105	0	12	20	0	30	0	18	0	208
Total	2,452	1,439	8	600	1,234	6	217	434	1,156	0	7,546
Poletimber:											
120+	282	0	0	26	170	0	0	0	181	0	659
85 to 120	24	24	0	12	14	0	12	0	76	0	162
50 to 85	164	96	0	10	0	5	115	5	50	0	445
20 to 50	6	31	0	7	0	0	8	0	12	0	64
Total	476	51	0	55	184	5	135	5	319	0	1,330

See footnote at end of table.

TABLE 48.—*Area of commercial timberland by ownership, forest type, stand size, and site, 1970* [1]—*Pacific Coast*—Continued

[Thousand acres]

FOREST INDUSTRY—Continued

Stand size and site	Douglas-fir	Ponderosa pine	Western white pine	Fir-spruce	Hemlock-Sitka spruce	Larch	Lodgepole pine	Redwood	Western hardwoods	Nonstocked	Total
Seedlings and saplings:											
120+	568	9	0	38	555	0	0	36	322	251	1,779
85 to 20	271	46	0	38	96	0	0	0	140	120	711
50 to 85	164	26	0	32	73	25	39	0	169	125	653
20 to 50	68	41	0	0	0	0	10	0	51	30	200
Total	1,071	122	0	108	724	25	49	36	682	526	3,343
All size classes:											
120+	2,475	327	0	339	1,694	0	0	418	1,158	251	6,662
85 to 120	705	489	8	211	230	6	34	37	505	120	2,345
50 to 85	722	719	0	194	198	30	319	20	413	125	2,740
20 to 50	97	177	0	19	20	0	48	0	81	30	472
Total	3,999	1,712	8	763	2,142	36	401	475	2,157	526	12,219

FARM AND MISCELLANEOUS PRIVATE

Stand size and site	Douglas-fir	Ponderosa pine	Western white pine	Fir-spruce	Hemlock-Sitka spruce	Larch	Lodgepole pine	Redwood	Western hardwoods	Nonstocked	Total
Sawtimber:											
120+	1,076	588	0	286	320	10	1	239	1,154	0	3,676
85 to 120	465	550	0	128	97	0	45	16	498	0	1,799
50 to 85	831	759	0	254	58	15	205	5	484	0	2,612
20 to 50	144	427	0	90	17	0	43	0	108	0	829
Total	2,516	2,324	0	759	493	25	294	260	2,245	0	8,917
Poletimber:											
120+	235	50	0	57	62	0	0	16	306	0	728
85 to 120	82	82	0	19	16	13	16	1	132	0	361
50 to 85	367	235	0	19	17	14	139	0	157	0	948
20 to 50	49	181	0	9	0	0	10	0	63	0	312
Total	733	548	0	104	95	27	165	17	658	0	2,349
Seedlings and saplings:											
120+	362	19	8	62	132	0	8	15	485	638	1,731
85 to 120	132	61	0	7	36	10	0	5	279	265	795
50 to 85	230	85	0	11	88	20	32	0	303	460	1,229
20 to 50	27	26	0	2	0	8	44	0	87	223	417
Total	751	191	8	82	257	38	84	20	1,155	1,586	4,173
All size classes:											
120+	1,673	657	8	405	515	10	9	270	1,947	638	6,135
85 to 120	679	693	0	154	150	23	61	22	909	265	2,957
50 to 85	1,428	1,079	0	284	163	49	376	5	944	460	4,790
20 to 50	220	634	0	101	17	8	97	0	258	223	1,559
Total	4,000	3,063	8	945	847	90	543	297	4,059	1,586	15,441

ALL OWNERSHIPS

Stand size and site	Douglas-fir	Ponderosa pine	Western white pine	Fir-spruce	Hemlock-Sitka spruce	Larch	Lodgepole pine	Redwood	Western hardwoods	Nonstocked	Total
Sawtimber:											
120+	5,588	1,547	20	1,925	3,696	53	10	649	2,417	0	15,907
85 to 120	2,652	2,785	31	1,677	2,417	79	266	54	1,191	0	11,153
50 to 85	4,710	5,009	24	2,455	1,379	173	825	22	1,092	0	15,690
20 to 50	671	1,712	45	601	191	37	134	0	177	0	3,570
Total	13,621	11,053	120	6,659	7,685	342	1,235	725	4,879	0	46,321
Poletimber:											
120+	821	71	1	193	420	19	18	16	709	0	2,269
85 to 120	284	256	1	162	135	58	512	1	270	0	1,680
50 to 85	1,018	773	0	300	77	73	945	5	300	0	3,493
20 to 50	142	404	0	83	4	10	86	0	84	0	814
Total	2,265	1,504	2	739	638	160	1,561	22	1,363	0	8,256
Seedlings and saplings:											
120+	1,442	89	14	230	1,043	33	19	51	1,057	1,470	5,451
85 to 120	625	271	55	165	284	59	109	5	485	680	2,738
50 to 85	778	420	5	192	255	90	279	0	587	1,113	3,720
20 to 50	170	171	2	42	15	27	91	0	172	442	1,133
Total	3,015	951	76	629	1,598	209	498	56	2,302	3,707	13,044
All size classes:											
120+	7,852	1,708	35	2,348	5,160	105	47	716	4,184	1,470	23,628
85 to 120	3,561	3,312	87	2,004	2,837	196	887	60	1,946	680	15,572
50 to 85	6,506	6,202	29	2,948	1,712	336	2,049	27	1,980	1,113	22,904
20 to 50	983	2,287	47	727	211	74	311	0	434	442	5,518
Total	18,902	13,509	198	8,029	9,922	711	3,294	803	8,545	3,707	67,622

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[1] Data may not add to totals because of truncating. Zeros indicate no data or negligible amounts.

APPENDIX II

Glossary of Terms

Acceptable tree. Growing-stock tree of commercial species that meets specified standards of size and quality, but not qualifying as desirable tree.

Allowable harvest. The volume of timber that would be cut on commercial timberland during a given period under specified management plans aimed at sustained production of timber products.

Coarse residue. Plant residue that is suitable for chipping, such as slabs, edgings, and veneer cores.

Commercial timberland. Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. (Note: Areas qualifying as commercial timberland have the capability of producing in excess of 20 cubic feet per acre per year of industrial wood in natural stands. Currently inaccessible and inoperable areas are included, except when the areas involved are small and unlikely to become suitable for production of industrial wood in the foreseeable future.)

Cord. A pile of stacked wood containing 128 cubic feet within its outside surfaces. The standard dimensions are 4 by 4 by 8 feet.

Cropland. Land under cultivation within the past 24 months, including cropland harvested, crop failures, cultivated summer fallow, idle cropland used only for pasture, orchards, and land in soil improving crops, but excluding land cultivated in developing improved pasture.

Deferred forest land. National Forest land that meets productivity standards for commercial timberland, but under study for possible inclusion in the Wilderness System.

Desirable tree. Growing-stock tree (a) having no serious defects in quality limiting present or prospective use for timber products, (b) of relatively high vigor, and (c) containing no pathogens that may result in death or serious deterioration before rotation age. (Note: This is the type of tree forest managers try to grow; that is, the tree favored in cultural operations. In over-rotation-age stands, desirable trees are low-risk trees.)

Diameter classes. A classification of trees based on diameter outside bark, measured at breast height (4–½ feet above the ground). (Note: D.b.h. is the common abbreviation for diameter at breast height. Two-inch diameter classes are commonly used in Forest Survey, with the even inch the approximate midpoint for a class. For example, the 6-inch class includes trees 5.0 through 6.9 inches d.b.h., inclusive.)

Farm. A place of 10 or more acres from which the sale of agricultural products totaled $50 or more annually, or a place of less than 10 acres from which the sale of agricultural products totaled $250 or more during the previous year.

Farm and miscellaneous lands. Privately owned lands other than in forest industry ownership.

Fine residues. Residues not suitable for chipping, such as sawdust, shavings, and veneer clippings.

Forest land. Land at least 10 percent occupied by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use. (Note: The minimum area for classification of forest land is 1 acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width at least 120 feet wide to qualify as forest land. Unimproved roads and trails, streams, or other bodies of water or clearings in forest areas are classed as forest if less than 120 feet in width.) Also see definitions for land area, commercial timberland, noncommercial forest land, productive-reserved forest land, stocking, and unproductive forest land.

Forest site productivity class. A classification of forest land in terms of potential cubic-foot volume growth per acre at culmination of mean annual increment in fully stocked natural stands.

Forest type. A classification of forest land based upon the species forming a plurality of live-tree stocking. Type is determined on the basis of species plurality of all live trees that contribute to stocking.

Growing-stock trees. Live trees of commercial species qualifying as desirable or acceptable trees. Excludes rough, rotten, and dead trees.

Growing-stock volume. Net volume in cubic feet of growing-stock trees 5.0 inches d.b.h. and over from a 1-foot stump to a minimum 4.0-inch top diameter outside bark of the central stem or to the point where the central stem breaks into limbs.

Growth impact. Mortality plus growth loss.

Growth loss. Timber loss due to (a) delay in restocking or deficiencies in stocking resulting from damage by insects, disease, animals, fire, or adverse weather, and (b) the reduction in growth due to changes in timber type, defoliation, reduction of tree vigor, increase in cull percent, or deterioration of site due to destructive agents.

Hardwoods. Dicotyledonous trees, usually broad-leaved and deciduous.

Indian lands. Tribal lands held in fee by the Federal Government, but administered for Indian tribal groups, and Indian trust allotments.

Industrial wood. All roundwood products, except fuelwood.

Ingrowth. The number or net volume of trees that grow large enough during a specified year to qualify as saplings, poletimber, or sawtimber.

Land area.

a. *Bureau of the Census.* The area of dry land and land temporarily or partly covered by water, such as marshes, swamps and river flood plains (omitting tidal flats below mean high tide); streams, sloughs, estuaries and canals less than ⅛ of a statute mile in width; and lakes, reservoirs and ponds less than 40 acres in area.

b. *Forest Survey.* Same as the Bureau of the Census except minimum width of streams, etc. is 120 feet and minimum size of lakes, etc. is 1 acre.

Limbwood. That part of the tree above the stump which does not meet the requirement for saw logs and upper-stem portions, including all live, sound branches to a minimum of 4 inches outside bark.

Log scale. A measure of the board-foot content of roundwood. Local scale may include Scribner, Doyle or other rules. The international ¼-inch log rule is used as standard in the Forest Survey.

Logging residues. Unused portions of trees cut or killed by logging.

Mortality. Number or sound-wood volume of live trees dying from natural causes during a specified period.

Multiple-use management. The management of land resources aimed at achieving optimum yields of products and services from a given area without impairing the productive capacity of the site.

National Forest lands. Federal lands which have been legally designated as National Forests or purchase units, and other lands under the administration of the Forest Service, including experimental areas and Bankhead-Jones Title III lands.

Net annual growth. The increase in volume of trees during a specified year. Components of net annual growth include the increment in net volume of trees at the beginning of the specified year surviving to its end, plus the net volume of trees reaching the minimum size class during the year, minus the volume of trees that died during the year, and minus the net volume of trees that became rough or rotten trees during the year.

Net volume in board feet. The gross board-foot volume of trees less deductions for rot or other defect affecting use for lumber.

Net volume in cubic feet. Gross volume in cubic feet less deductions for rot.

Noncommercial forest land. (1) Unproductive forest land incapable of yielding crops of industrial wood, because of adverse site conditions and (2) productive forest land reserved for nontimber uses.

Noncommercial species. Tree species of typically small size, poor form, or inferior quality which normally do not develop into trees suitable for industrial wood products.

Nonforest land. Land that has never supported forests and lands formerly forested where use for timber management is precluded by development for other uses. (Note: Includes areas used for crops, improved pasture, residential areas, city parks, improved roads of any width and adjoining clearings, powerline clearings of any width, and 1- to 40-acre areas of water classified by the Bureau of the Census as land. If intermingled in forest areas, unimproved roads and nonforest strips must be more than 120 feet wide, and clearings, etc., more than 1 acre in size, to qualify as nonforest land.)

Nonstocked areas. Commercial timberland less than 10 percent occupied with growing-stock trees.

Old-growth stands. Stands in which 50 percent or more of the area is occupied by old-growth timber.

Old-growth timber. Trees that are at least 100 years old.

Other removals. The net volume of growing-stock trees removed from the inventory by cultural operations such as timber-stand improvement, by land clearing and by changes in land use, and not utilized for timber products.

Pasture and rangeland. Land which is currently improved for grazing by cultivation, seeding or irrigation, and natural grasslands.

Plant byproducts. Wood products such as pulp chips obtained incidental to production of other manufactured products.

Plant residues. Waste materials from the manufacture of lumber, plywood and other wood products. Includes slabs, edgings, trimmings, miscuts, sawdust, shavings, veneer cores and clippings, and pulp screenings.

Poletimber stands. Stands at least 10 percent occupied with growing-stock trees of which half or more of this stocking is in poletimber and/or sawtimber trees, and with poletimber stocking exceeding that of sawtimber.

Prescribed burning. The application of fire to land under such conditions of weather, soil moisture, and other factors as presumably will accomplish specific silvicultural, wildlife, grazing, or fire-hazard-reduction purposes.

Primary wood-processing plants. Plants using round wood products such as saw logs, pulpwood bolts, veneer logs, etc.

Productive-reserved forest land. Forest land sufficiently productive to qualify as commercial timberland, but withdrawn from timber utilization through statute or administrative designation.

Removals. Volumes of timber removed from the growing-stock inventory, including timber products, logging residues, and other removals such as land clearing.

Rotation. The period of years between establishment of a stand of timber and the time when it is considered ready for final harvest and regeneration.

Rotten tree. Live tree of commercial species that does not contain, now or prospectively, at least one 12-foot saw log or two noncontiguous saw logs each 8 feet or longer, and/or does not meet regional specifications for freedom from defect primarily because of rot; that is, when more than 50 percent of the cull volume in a tree is rotten.

Rough tree. (1) Live tree of commercial species that does not contain, now or prospectively, at least one 12-foot saw log or two noncontiguous saw logs each 8 feet or longer, and/or does not meet regional specifications for freedom from defect primarily because of roughness or poor form, and (2) live tree of noncommercial species.

Roundwood products. Logs, bolts, or other round sections cut from trees for industrial or consumer use.

Roundwood equivalent. The volume of logs or other round products required to produce woodpulp, lumber, or other processed products.

Salvable dead trees. Standing or down dead trees that are considered merchantable by regional standards.

Sampling error. The probable error of an estimated total or average that arises from taking a sample rather than making a complete inventory or measurement.

Saplings. Live trees 1.0 inch to 5.0 inches in diameter at breast height.

Saw-log portion. That part of the bole of sawtimber trees between the stump and the saw-log top.

Saw logs. Logs meeting minimum regional standards of diameter, length, and defect. Logs must be at least 8 feet long, have a minimum diameter inside bark of 6 inches for softwoods and 8 inches for hardwoods and maximum defect as specified by regional standards.

Sawtimber stands. Stands at least 10 percent occupied with growing-stock trees, with half or more of total stocking in sawtimber or poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

Sawtimber trees. Live trees of commercial species containing at least one 12-foot saw log or two noncontiguous 8-foot logs, and meeting regional specifications for freedom from defect. Softwood trees must be at least 9.0 inches in diameter breast height, except in California, Oregon, Washington, and coastal Alaska where the minimum diameter is 11.0 inches. Hardwood trees must be at least 11.0 inches in diameter in all States.

Secondary wood-processing plants. Plants using primary manufactured products such as lumber, woodpulp, veneer, or plywood.

Seedling and sapling stands. Stands at least 10 percent occupied with growing-stock trees of which more than half of the stocking is saplings and/or seedlings.

Seedlings. Live trees less than 1.0 inch in diameter at breast height that are expected to survive according to regional standards.

Site preparation. Removal or deadening of unwanted vegetation prior to planting trees, including prescribed burning, use of herbicides, and disking and other mechanical means of removing vegetative cover.

Softwoods. Coniferous trees, usually evergreen having needles or scalelike leaves.

Stand improvement. Measures such as thinning, release cutting, girdling, weeding, or poisoning of unwanted trees aimed at improving growing conditions.

Stand-size class. A classification of forest land based on the size class of growing-stock trees on the area; that is, sawtimber, poletimber, or seedlings and saplings.

Stocking. The degree of occupancy of land by trees, measured by basal area and/or number of trees by size or age and spacing, compared to a stocking standard, i.e., the basal area and/or number of trees required to fully utilize the growth potential of the land.

Timber demand. The volume of timber that would be purchased at specified prices at a specified point in time under specified or implied assumptions relating to population, income, and other technological or institutional factors.

Timber supply (or timber harvest). Net volume of roundwood products available to forest industries from all sources at specified or implied price levels.

Tree size class. A classification of trees based on diameter at breast height, including sawtimber trees, poletimber trees, saplings and seedlings.

Trend level. Estimate based on a curve or regression equation constructed from observed values over time.

Unproductive forest land. Forest land incapable of producing 20 cubic feet per acre of industrial wood under natural conditions because of adverse site conditions such as sterile soils, dry climate, poor drainage, high elevation, steepness, or rockiness.

Unregulated forest land. Commercial timberland in National Forests not organized for timber production under sustained-yield principles, including experimental forests, recreation and administrative sites, and tracts of commercial timberland so remote from manufacturing centers that scheduling sustained periodic harvest is impractical.

Upper stems. That part of the bole of sawtimber trees above the saw-log top to a minimum top diameter of 4.0 inches outside bark or to the point where the central stem breaks into limbs.

Wilderness area. An area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve natural conditions.

Young-growth stands. Stands in which 50 percent or more of the stand is occupied by sawtimber trees less than 100 years old.

APPENDIX III

Timber Supply Tables

Table No.

1 Estimated costs and softwood harvest change with intensified forest management on farm and miscellaneous private lands, by rate of return grouping at 1970 prices.

2 Estimated costs and softwood harvest change with intensified forest management on National Forests, by rate of return grouping at 1970 prices.

3 Estimated costs and softwood harvest change with intensified forest management on farm and miscellaneous private lands, by rate of return and alternative prices.

4 Estimated costs and softwood harvest change with intensified forest management of National Forest lands, by rate of return and price alternatives.

5 Estimated costs and softwood harvest change on farm and miscellaneous private lands with continuing programs of intensification.

6 Estimated costs and softwood harvest change on National Forest lands with continuing programs of intensification.

TABLE 1.—*Estimated costs and softwood harvest change uith intensified forest management on farm and miscellaneous private lands, by rate of return grouping at 1970 prices*

Section and return group	Acres	Costs			Softwood harvest change within the decade									
		Direct cost	Total cost	Federal share	1–10 years		11–20 years		21–30 years		31–40 years		41–50 years	
	Thousands	*Million dollars*	*Million dollars*	*Million dollars*	*Million bd. ft.*	*Million cu. ft.*	*Million bd. ft.*	*Million cu. ft.*	*Million bd. ft.*	*Million cu. ft.*	*Million bd. ft.*	*Million cu. ft.*	*Million bd. ft.*	*Million cu. ft.*
North:														
7½%+														
5 to 7½%	1,165	28.4	34.1	25.2					126	213	955	293	2,155	460
2½ to 5%	1,650	78.5	85.5	63.3		30				308		582	4,058	966
South:														
7½%+	4,383	140.1	168.3	123.3	1,059	733	432	183	7,893	6,065	10,008	3,800	22,956	6,286
5 to 7½%	3,427	121.0	142.5	105.2		731					9,985	7,661		
2½ to 5%	2,000	106.0	119.2	88.4							7,400	5,732		
Pacific Coast:														
7½%+	45		0.3	0.2	137	739	216	36	110	18	98	16	−254	−42
5 to 7½%	18	0.6	0.7	0.5					37	6	101	17	68	11
2½ to 5%[1]														
All regions:														
7½%+	4,428	140.1	168.5	123.4	1,196	1,472	648	219	8,002	6,083	10,016	3,822	22,702	6,244
5 to 7½%	4,610	150.0	177.2	130.9		731			163	219	11,042	7,970	2,223	471
2½ to 5%	3,650	184.5	204.7	151.7		30				308	7,490	6,314	4,058	966
Total studied	12,688	474.6	550.4	406.0	1,196	2,233	648	219	8,165	6,610	28,458	18,106	28,983	7,681

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[1] No situations studied in this group.

TABLE 2.—*Estimated costs and softwood harvest change with intensified forest management on National Forests, by rate of return grouping at 1970 prices*

Section and return group	Acres	Costs		Softwood harvest change within the decade[1]									
		Direct	Total	1–10 years		11–20 years		21–30 years		31–40 years		41–50 years	
	Thousands	*Million dollars*	*Million dollars*	*Million bd. ft.*	*Million cu. ft.*	*Million bd. ft.*	*Million cu. ft.*	*Million bd. ft.*	*Million cu. ft.*	*Million bd. ft.*	*Million cu. ft.*	*Million bd. ft.*	*Million cu. ft.*
North:													
7½%+	304	5.3	10.8	--------	--------	130	104	844	40	1,747	53	1,396	−74
5 to 7½%	145	6.8	13.6	--------	--------	--------	--------	22	79	143	5	611	32
2½ to 5%	127	6.1	12.0	--------	--------	--------	--------	--------	32	--------	42	301	39
South:													
7½%+	223	3.8	7.9	--------	--------	93	2	491	153	856	5	1,714	9
5 to 7½%	137	7.9	15.3	--------	--------	--------	--------	66	2	334	105	634	18
2½ to 5%	410	24.8	47.7	--------	--------	--------	--------	--------	--------	--------	233	396	61
Rocky Mountains:													
5 to 7½%	241	4.3	8.5	683	--------	967	--------	1,023	--------	1,080	--------	1,080	--------
2½ to 5%	860	23.0	44.8	1,740	--------	2,833	--------	3,347	--------	3,860	--------	3,860	--------
0 to 2½%	804	49.7	98.3	1,973	--------	2,647	--------	2,663	--------	2,680	--------	2,680	--------
Pacific Coast:													
7½%+	276	5.1	10.5	728	--------	970	--------	970	--------	970	--------	970	--------
5 to 7½%	327	7.9	15.8	1,013	--------	1,350	--------	1,350	--------	1,350	--------	1,350	--------
2½ to 5%	427	20.9	41.3	1,613	--------	2,150	--------	2,150	--------	2,150	--------	2,150	--------
0 to 2½%	231	15.1	29.6	668	--------	890	--------	890	--------	890	--------	890	--------
All regions:													
7½%+	803	14.2	29.2	728	--------	1,193	106	2,305	193	3,573	58	4,080	−65
5 to 7½%	850	26.9	53.2	1,696	--------	2,317	--------	2,461	81	2,907	110	3,675	50
2½ to 5%	1,824	74.8	145.8	3,353	--------	4,983	--------	5,497	32	6,010	275	6,707	100
0 to 2½%	1,035	64.8	127.9	2,641	--------	3,537	--------	3,553	--------	3,570	--------	3,570	--------
Total studied	4,512	180.7	356.1	8,418	--------	12,030	106	13,816	306	16,060	443	18,032	85

[1] An allowable cut effect from intensified management was assumed in estimating future increases in harvests, but not in calculating rates of return on increased costs of management.

TABLE 3.—*Estimated costs and softwood harvest change with intensified forest management on farm and miscellaneous private lands, by rate of return and alternative prices*

NORTH

Treatment and price	Acres	Costs			Softwood harvest change within the decade									
		Direct	Total	Federal	1–10 years		11–20 years		21–30 years		31–40 years		41–50 years	
	Thousands	*Million dollars*	*Million dollars*	*Million dollars*	*Million bd. ft.*	*Million cu. ft.*	*Million bd. ft.*	*Million cu. ft.*	*Million bd. ft.*	*Million cu. ft.*	*Million bd. ft.*	*Million cu. ft.*	*Million bd. ft.*	*Million cu. ft.*
Reforestation:														
5%+, 1970 prices [1]	1,045	26.2	31.6	23.3	---	---	---	---	126	213	703	133	2,155	460
5%+, 1970+30% [2]	2,695	101.2	113.0	83.5	---	---	---	---	126	521	703	716	6,213	1,426
TSI:														
5%+, 1970 prices	120	2.2	2.5	1.9	---	---	---	---	---	---	252	160	---	---
5%+, 1970+30%	120	2.2	2.5	1.9	---	---	---	---	---	---	252	160	---	---
Total:														
5%+, 1970 prices	1,165	28.4	34.1	25.2	---	---	---	---	126	213	955	293	2,155	460
5%+, 1970+30%	2,815	103.4	115.5	85.4	---	---	---	---	126	521	955	876	6,213	1,426

SOUTH

Treatment and price	Acres	Direct	Total	Federal	1–10 years bd. ft.	1–10 years cu. ft.	11–20 years bd. ft.	11–20 years cu. ft.	21–30 years bd. ft.	21–30 years cu. ft.	31–40 years bd. ft.	31–40 years cu. ft.	41–50 years bd. ft.	41–50 years cu. ft.
Reforestation:														
5%+, 1970 prices	6,989	254.3	299.6	221.4	897	1,253	---	---	7,822	6,061	19,393	11,205	22,956	6,286
5%+, 1970+30%	8,989	360.3	418.8	309.8	897	1,253	---	---	7,822	6,061	26,793	16,937	22,956	6,286
TSI:														
5%+, 1970 prices	259	4.6	5.5	4.0	---	---	---	---	---	---	600	261	---	---
5%+, 1970+30%	259	4.6	5.5	4.0	---	---	---	---	---	---	600	261	---	---
Commercial thinning:														
5%+, 1970 prices	562	2.2	5.7	3.1	162	210	432	183	70	4	---	---	---	---
5%+, 1970+30%	562	2.2	5.7	3.1	162	210	432	183	70	4	---	---	---	---
Total:														
5%+, 1970 prices	7,810	261.1	310.8	228.5	1,059	1,463	432	183	7,892	6,065	19,993	11,466	22,956	6,286
5%+, 1970+30%	9,810	367.1	430.0	316.9	1,059	1,463	432	183	7,892	6,065	27,393	17,198	22,956	6,286

PACIFIC COAST

Reforestation:														
5%+, 1970 prices	12	.4	.5	.3							65	11	77	13
5%+, 1970+30%	12	.4	.5	.3							65	11	77	13
TSI:														
5%+, 1970 prices	6	.2	.2	.2					37	6	37	6	−9	−2
5%+, 1970+30%	6	.2	.2	.2					37	6	37	6	−9	−2
Commercial thinning:														
5%+, 1970 prices	45		.3	.2	137	739	216	37	110	18	98	16	−254	−42
5%+, 1970+30%	45		.3	.2	137	739	216	37	110	18	98	16	−254	−42
Total:														
5%+, 1970 prices	63	.6	1.0	.7	137	739	216	37	147	24	200	33	−186	−31
5%+, 1970+30%	63	.6	1.0	.7	137	739	216	37	147	24	200	33	−186	−31

ALL REGIONS

Reforestation:														
5%+, 1970 prices	8,046	280.9	331.7	245.0	897	1,253			7,948	6,274	20,161	11,349	25,188	6,759
5%+, 1970+30%	11,096	461.9	532.3	393.6	897	1,253			7,948	6,582	27,561	17,664	29,246	7,725
TSI:														
5%+, 1970 prices	385	7.0	8.2	6.1					37	6	889	427	−9	−2
5%+, 1970+30%	385	7.0	8.2	6.1					37	6	889	427	−9	−2
Commercial thinning:														
5%+, 1970 prices	607	2.2	6.0	3.3	299	949	648	219	180	22	98	16	−254	−42
5%+, 1970+30%	607	2.2	6.0	3.3	299	949	648	219	180	22	98	16	−254	−42
Total:														
5%+, 1970 prices	9,038	290.1	345.9	254.4	1,196	2,202	648	220	8,165	6,302	21,148	11,792	24,925	6,715
5%+, 1970+30%	12,688	471.1	546.5	403.0	1,196	2,202	648	220	8,165	6,610	28,548	18,107	28,983	7,681

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[1] This group contains opportunities which return 5 or more percent return on investments when timber outputs are valued at 1970 prices.

[2] This group contains opportunities which return 5 or more percent return on the investment when timber outputs are valued at prices 30 percent above the 1970 prices. Additional opportunities undoubtedly exist at this higher price level but were not included in this analysis.

TABLE 4.—*Estimated costs and softwood harvest change with intensified forest management of National Forest lands, by rate of return and price alternatives*

NORTH

Treatments and prices	Acres	Costs		Softwood harvest change within the decade[1]									
		Direct	Total	1–10 years		11–20 years		21–30 years		31–40 years		41–50 years	
	Thousands	*Million dollars*	*Million dollars*	*Million bd. ft.*	*Million cu. ft.*	*Million bd. ft.*	*Million cu. ft.*	*Million bd. ft.*	*Million cu. ft.*	*Million bd. ft.*	*Million cu. ft.*	*Million bd. ft.*	*Million cu. ft.*
Reforestation:													
5%+, 1970 prices[2]	132	6.6	13.1					22	71	114		586	37
5%+, 1970+30%[3]	185	9.3	18.3					22	103	114		776	54
Total studied[4]	259	12.7	25.1					22	103	114	42	887	76
TSI:													
5%+, 1970 prices	317	5.5	11.3			130	104	884	48	1,776	58	1,421	−79
5%+, 1970+30%	317	5.5	11.3			130	104	884	48	1,776	58	1,421	−79
Total studied	317	5.5	11.3			130	104	884	48	1,776	58	1,421	−79

SOUTH

Treatments and prices	Acres	Direct	Total	1–10 years bd. ft.	1–10 years cu. ft.	11–20 years bd. ft.	11–20 years cu. ft.	21–30 years bd. ft.	21–30 years cu. ft.	31–40 years bd. ft.	31–40 years cu. ft.	41–50 years bd. ft.	41–50 years cu. ft.
Reforestation:													
5%+, 1970 prices	136	7.9	15.3					66	2	334	100	631	18
5%+, 1970+30%	519	31.0	59.8					66	2	334	334	1,014	76
Total studied	546	32.7	63.0					66	2	334	338	1,027	79
TSI:													
5%+, 1970 prices	224	3.8	7.9			93	2	491	153	856	5	1,717	9
5%+, 1970+30%	224	3.8	7.9			93	2	491	153	856	5	1,717	9
Total studied	224	3.8	7.9			93	2	491	153	856	5	1,717	9

ROCKY MOUNTAINS

Reforestation:													
5%+, 1970 prices	---	---	---	---	---	---	---	---	---	---	---	---	---
5%+, 1970+30%	78	3.4	6.5	397	---	529	---	529	---	529	---	529	---
Total studied	913	55.9	110.6	2,552	---	3,402	---	3,402	---	3,402	---	3,402	---
TSI:													
5%+, 1970 prices	241	4.3	8.5	683	---	968	---	1,024	---	1,081	---	1,081	---
5%+, 1970+30%	992	20.8	41.0	1,843	---	3,047	---	3,637	---	4,227	---	4,227	---
Total studied	992	20.2	41.0	1,843	---	3,047	---	3,637	---	4,227	---	4,227	---

PACIFIC COAST

Reforestation:													
5%+, 1970 prices	---	---	---	---	---	---	---	---	---	---	---	---	---
5%+, 1970+30%	56	3.5	7.0	283	---	377	---	377	---	377	---	377	---
Total studied	459	29.6	58.1	1,728	---	2,304	---	2,304	---	2,304	---	2,304	---
TSI:													
5%+, 1970 prices	603	13.0	26.3	1,742	---	2,322	---	2,322	---	2,322	---	2,322	---
5%+, 1970+30%	802	19.4	39.1	2,295	---	3,060	---	3,060	---	3,060	---	3,060	---
Total studied	802	19.4	39.1	2,295	---	3,060	---	3,060	---	3,060	---	3,060	---

ALL REGIONS

Reforestation:													
5%+, 1970 prices	268	14.5	28.4	---	---	---	---	88	73	448	105	1,217	55
5%+, 1970+30%	838	47.2	91.6	680	---	906	---	994	105	1,354	334	2,696	130
Total studied	2,177	173.6	256.8	4,280	---	5,706	---	5,794	100	6,154	380	7,620	155
TSI:													
5%+, 1970 prices	1,385	26.6	54.0	2,425	---	3,513	106	4,721	201	6,035	63	6,541	−70
5%+, 1970+30%	2,335	49.5	99.3	4,138	---	6,330	106	8,072	201	9,919	63	10,425	−70
Total studied	2,335	49.5	99.3	4,138	---	6,330	106	8,072	201	9,919	63	10,425	−70
Both treatments:													
5%+, 1970 prices	1,653	41.1	82.4	2,425	---	3,513	106	4,809	274	6,483	168	7,758	15
5%+, 1970+30%	3,173	96.7	190.8	4,817	---	7,236	103	9,066	306	11,273	397	13,121	65
Total studied [5]	4,512	180.4	355.9	8,418	---	12,026	106	13,866	306	16,073	443	18,045	85

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[1] In estimating harvest schedules on western National Forests, an "allowable cut effect" was assumed.

[2] This group contains opportunities which return 5 or more percent return on investments when timber products are valued at 1970 prices.

[3] This group contains opportunities which return 5 or more percent return on investments when timber products are valued at prices 30 percent above the 1970 prices.

[4] This group includes all situations studied, including those returning less than 5 percent at prices 30 percent above 1970.

[5] This includes only reforestation and TSI opportunities subjected to detailed economic evaluation. Estimates of volume available from commercial thinning are shown separately.

TABLE 5.—*Estimated costs and softwood harvest change on farm and miscellaneous private lands with continuing programs of intensification*

Selection criteria and treatment	Annual acres	Annual cost			Softwood harvest change, by specified years									
		Direct	Total	Federal	Year 5		Year 15		Year 25		Year 35		Year 45	
	Thousands	*Million dollars*	*Million dollars*	*Million dollars*	*Million bd. ft.*	*Million cu. ft.*	*Million bd. ft.*	*Million cu. ft.*	*Million bd. ft.*	*Million cu. ft.*	*Million bd. ft.*	*Million cu. ft.*	*Million bd. ft.*	*Million cu. ft.*
5%+ rate of return at 1970 prices:														
Reforestation	804.6	28.1	33.2	24.5	90	125	90	125	885	753	2,901	1,888	5,419	2,563
TSI	38.5	.7	.8	.6					4	1	93	43	92	43
Commercial thinning	60.7	.2	.6	.3	30	95	95	117	113	119	123	121	97	116
Total	903.8	29.0	34.6	25.4	120	220	184	242	1,001	872	3,116	2,052	5,608	2,723
5%+ rate of return at 1970 prices plus 30%:														
Reforestation	1,169.6	46.2	53.2	39.4	90	125	90	125	885	784	3,641	2,550	6,565	3,322
TSI	38.5	.7	.8	.6					4	1	93	43	92	43
Commercial thinning	60.7	.2	.6	.3	30	95	95	117	113	119	123	121	97	116
Total	1,268.8	47.1	54.6	40.3	120	220	184	242	1,001	872	3,856	2,714	6,754	3,481

TABLE 6.—*Estimated costs and softwood harvest change on National Forest lands with continuing programs of intensification*

Return group and treatment	Acres	Annual cost		Softwood harvest change, by specified years									
		Direct	Total	Year 5		Year 15		Year 25		Year 35		Year 45	
	Thousands	*Million dollars*	*Million dollars*	*Million bd. ft.*	*Million cu. ft.*	*Million bd. ft.*	*Million cu. ft.*	*Million bd. ft.*	*Million cu. ft.*	*Million bd. ft.*	*Million cu. ft.*	*Million bd. ft.*	*Million cu. ft.*
5%+ rate of return at 1970 prices [1]:													
Reforestation	13.4	0.73	1.42					4	4	27	9	83	8
TSI	128.5	2.66	5.40	243		594	11	1,066	31	1,669	37	2,324	30
Total	141.9	3.39	6.82	243		594	11	1,070	34	1,696	46	2,407	38
5%+ rate of return at 1970 prices plus 30%:													
Reforestation	41.9	2.36	4.58	34		79		95	5	17	22	303	23
TSI	233.5	4.95	9.93	414		1,047	11	1,854	31	2,846	37	3,888	30
Total	275.4	7.31	14.51	448		1,126	11	1,949	36	2,963	59	4,091	53
Total studied [2]:													
Reforestation	108.9	8.68	12.84	214		499		575	5	597	24	689	27
TSI	233.5	4.95	9.93	414		1,047	11	1,854	31	2,846	37	3,888	30
All treatments	342.4	13.63	22.77	628		1,546	11	2,429	36	3,443	61	4,577	57

[1] The harvest increases from reforestation intensification result from a 20-year program at the indicated acreages and costs. The annual TSI program is repeated for 50 years.

[2] Including areas with projected returns of less than 5 percent.

APPENDIX IV

Timber Imports and Exports

Table No.
1 Imports of timber products, by softwoods and hardwoods and major product, 1950–72
2 Imports of lumber, by softwoods and hardwoods and country of origin, 1950–72
3 Imports of pulp products, by product, 1950–72
4 Imports of hardwood plywood, by country of origin, 1950–72
5 Imports of hardwood veneer, by country of origin, 1950–72

Table No.
6 Exports of timber products, by softwoods and hardwoods and major product, 1950–72
7 Exports of lumber, by softwoods and hardwoods and country of destination, 1950–72
8 Exports of pulp products, by product, 1950–72
9 Exports of logs, by major species, 1950–72
10 Exports of logs, by major region of destination, 1950–72
11 Imports and exports of timber products, by product, 1940–72

TABLE 1.—*Imports of timber products, by softwoods and hardwoods and major product, 1950–72* [1]

[Million cubic feet, roundwood equivalent]

Year	Total			Industrial roundwood used for–											
				Lumber			Plywood and veneer			Pulp products [2]			Logs		
	Total	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Softwood	Hardwood
1950	1,520	1,395	125	535	490	45	5	(3)	5	935	880	55	45	25	20
1951	1,465	1,325	140	390	350	40	10	(3)	10	1,025	960	65	35	15	25
1952	1,375	1,260	115	385	355	35	10	(3)	10	945	885	60	30	20	15
1953	1,420	1,290	130	430	395	35	15	(3)	15	935	880	55	40	20	20
1954	1,460	1,330	130	480	445	30	30	(3)	30	920	865	55	35	20	15
1955	1,610	1,450	155	560	520	40	40	(3)	40	975	920	55	35	10	20
1956	1,640	1,465	175	530	490	40	45	----------	45	1,040	970	70	30	5	25
1957	1,490	1,325	165	460	425	40	45	(3)	45	960	895	60	25	5	15
1958	1,495	1,340	155	530	495	35	50	(3)	50	895	840	55	15	5	15
1959	1,700	1,500	200	635	585	50	75	----------	75	970	910	60	20	5	15
1960	1,675	1,500	180	610	570	45	60	(3)	60	985	925	60	20	5	15
1961	1,745	1,580	165	665	625	35	60	(3)	60	1,000	940	60	20	10	10
1962	1,910	1,705	205	760	715	45	75	(3)	75	1,055	980	70	20	5	10
1963	1,990	1,785	205	830	785	45	80	(3)	80	1,060	990	70	15	5	10
1964	2,035	1,810	225	815	765	45	90	(3)	90	1,120	1,045	75	10	(3)	10
1965	2,100	1,860	240	815	765	50	100	(3)	100	1,175	1,095	80	10	(3)	10
1966	2,230	1,955	275	810	745	65	115	5	110	1,290	1,200	90	15	5	10
1967	2,160	1,925	235	800	750	50	110	5	105	1,240	1,165	70	15	5	10
1968	2,395	2,090	310	960	905	55	165	5	160	1,260	1,175	85	15	5	10
1969	2,515	2,145	370	980	915	70	180	5	175	1,340	1,220	120	15	5	10
1970	2,420	2,090	335	955	900	50	170	5	165	1,275	1,165	110	25	15	5
1971	2,745	2,370	380	1,185	1,130	55	210	5	205	1,335	1,225	115	15	10	5
1972 [4]	2,945	2,515	430	1,470	1,400	70	265	10	255	1,205	1,105	100	5	(3)	5

[1] Data may not add to totals because of rounding.
[2] Includes both pulpwood and the pulpwood equivalent of woodpulp, paper, and board.
[3] Less than 2.5 million cubic feet.
[4] Preliminary.

Source: Compiled from data published by U.S. Department of Commerce, Bureau of the Census. *U.S. imports, commodity by country.* FT 135 (Monthly). Supt. of Documents, U.S. Government Printing Office, Washington, D.C.

TABLE 2.—*Imports of lumber, by softwoods and hardwoods and country of origin, 1950–72* [1]

[Million board feet]

Year	All species [2]				Softwoods				Hardwoods			
	Total	Canada	Mexico	Other	Total [3]	Canada [3]	Mexico	Other	Total	Canada	Mexico	Other
1950	3,423.5	3,102.2	208.0	113.3	3,140.2	2,899.5	191.4	49.3	283.2	202.7	16.6	64.0
1951	2,511.6	2,240.3	135.5	135.8	2,250.0	2,080.2	119.0	50.8	261.6	160.1	16.5	84.9
1952	2,481.6	2,257.7	106.0	117.9	2,266.9	2,139.9	92.1	35.0	214.7	117.9	13.9	82.9
1953	2,759.4	2,541.2	83.8	134.3	2,526.8	2,409.6	73.0	44.2	232.6	131.7	10.9	90.1
1954	3,063.1	2,844.1	80.0	139.0	2,854.6	2,747.7	74.5	32.4	208.5	96.4	5.5	106.6
1955	3,593.0	3,349.7	75.3	168.1	3,326.8	3,225.9	69.7	31.2	266.3	123.8	5.6	136.9
1956	3,404.5	3,168.3	51.6	184.6	3,131.0	3,060.7	47.8	22.5	273.5	107.6	3.8	162.1
1957	2,958.0	2,754.0	53.0	150.9	2,711.9	2,644.7	48.2	19.0	246.1	109.3	4.8	132.0
1958	3,389.6	3,177.8	49.3	162.5	3,154.5	3,088.0	45.1	21.4	235.1	89.7	4.3	141.1
1959	4,063.6	3,785.9	53.1	224.6	3,741.5	3,661.7	49.7	30.2	322.0	124.2	3.4	194.4
1960	3,930.6	3,693.9	41.6	195.1	3,639.3	3,576.1	36.9	26.4	291.2	117.8	4.7	168.7
1961	4,257.9	4,042.6	48.5	166.8	4,013.4	3,943.4	43.7	26.3	244.5	99.2	4.8	140.5
1962	4,892.9	4,637.7	47.8	207.4	4,583.7	4,507.1	40.4	36.2	309.2	130.6	7.4	171.2
1963	5,335.4	5,104.7	28.6	202.0	5,032.0	4,975.6	24.4	32.0	303.3	129.1	4.3	170.0
1964	5,222.6	5,004.1	10.2	208.4	4,917.5	4,872.0	7.0	38.5	305.1	132.0	3.1	169.9
1965	5,232.5	5,016.6	10.1	205.8	4,898.1	4,855.7	8.1	34.3	334.3	160.9	2.0	171.4
1966	5,200.1	4,920.9	5.2	274.0	4,779.2	4,730.4	3.7	45.2	420.8	190.5	1.5	228.8
1967	5,140.7	4,902.5	5.5	232.7	4,798.1	4,747.1	3.1	47.9	342.7	155.4	2.5	184.8
1968	6,154.2	5,899.2	4.0	251.1	5,809.1	5,750.0	3.2	55.9	345.1	149.2	.8	195.1
1969	6,300.6	5,963.4	6.7	330.6	5,854.0	5,784.4	5.8	63.7	446.6	179.0	.8	266.8
1970	6,114.3	5,867.6	7.5	239.3	5,777.7	5,722.5	5.5	49.7	336.7	145.1	2.0	189.6
1971	7,606.8	7,331.9	6.5	268.4	7,249.0	7,189.4	4.9	54.7	357.8	142.5	1.6	213.7
1972 [4]	9,430.1	9,029.1	20.8	380.1	8,984.8	8,877.8	18.9	88.1	445.2	151.3	1.9	292.0

[1] Data may not add to totals because of rounding.

[2] Excludes mixed species (not classified as softwoods or hardwoods) for the years 1950–59.

[3] Includes small volumes of hardwoods for the years 1960–72.

[4] Preliminary.

Source: See source note, table 1.

TABLE 3.—*Imports of pulp products, by product, 1950–72* [1]

[Million cords, roundwood equivalent]

Year	Total	Pulpwood [2]	Woodpulp	Paper and board
1950	12.0	1.4	4.3	6.3
1951	13.2	2.5	4.2	6.5
1952	12.1	2.1	3.5	6.5
1953	12.0	1.6	3.9	6.6
1954	11.8	1.6	3.7	6.5
1955	12.6	1.8	3.9	6.8
1956	13.4	1.9	4.1	7.4
1957	12.3	1.8	3.7	6.9
1958	11.5	1.4	3.7	6.5
1959	12.5	1.2	4.3	7.0
1960	12.7	1.3	4.2	7.2
1961	12.9	1.3	4.3	7.3
1962	13.6	1.4	4.8	7.3
1963	13.7	1.6	4.8	7.3
1964	14.4	1.5	5.0	8.0
1965	15.1	1.3	5.3	8.5
1966	16.5	1.4	5.7	9.4
1967	15.9	1.6	5.4	8.9
1968	16.2	1.4	5.9	8.8
1969	17.2	1.0	6.8	9.3
1970	16.3	1.1	6.0	9.2
1971	17.1	1.2	5.4	10.5
1972 [3]	15.4	1.0	5.7	8.7

[1] Data may not add to totals because of rounding.

[2] Roundwood and chips.

[3] Preliminary.

TABLE 4.—*Imports of hardwood*[1] *plywood, by country of origin, 1950–72*[2]

[Million square feet, surface measure]

Year	Total	Canada	Latin America				Asia						Africa	Europe	Other
			Total	Mexico	Central America and West Indies	South America	Total	Japan	Philippines	Taiwan	Korea	Other Asia			
1950	63.3	50.0	6.3	0.8	(3)	5.5	5.4	5.1	0.3	--------	--------	--------	(3)	1.5	--------
1951	70.2	47.2	5.6	.7	0.1	4.8	13.1	12.9	.1	--------	--------	0.1	0.4	3.8	(3)
1952	85.0	57.1	3.7	.9	.1	2.6	17.6	17.3	.1	0.1	--------	(3)	.6	6.0	--------
1953	220.4	50.8	8.6	2.1	1.9	4.5	106.3	105.0	.5	.4	--------	.4	3.6	51.0	--------
1954	434.0	71.1	8.0	3.4	.2	4.4	291.8	289.0	1.5	.1	--------	1.1	5.3	51.7	6.2
1955	627.6	99.3	8.9	3.6	1.4	3.9	439.1	428.6	9.8	.1	--------	.7	10.9	62.5	6.9
1956	706.5	81.2	5.3	.4	1.0	3.9	543.5	527.2	14.9	.4	--------	1.0	13.8	53.4	9.3
1957	846.4	64.4	9.2	1.8	1.9	5.6	717.6	679.8	33.2	3.4	--------	1.2	11.0	40.4	3.9
1958	911.4	42.4	11.9	6.0	.6	5.3	794.3	669.6	97.4	23.4	--------	3.9	15.6	46.3	.9
1959	1,330.2	60.2	32.1	8.6	4.4	19.1	1,083.0	810.9	213.6	37.3	0.4	20.8	25.8	125.1	4.0
1960	1,014.0	43.0	13.8	2.5	1.8	9.5	857.1	688.3	118.8	45.4	.2	4.4	16.7	83.2	.2
1961	1,097.4	42.1	17.7	1.4	2.5	13.9	962.0	660.5	153.4	108.6	15.9	23.7	14.6	58.6	2.4
1962	1,438.9	56.6	15.6	1.3	.7	13.7	1,269.2	740.1	214.4	212.5	51.4	50.8	13.8	83.7	--------
1963	1,620.7	71.9	18.8	1.2	1.2	16.4	1,428.4	739.8	246.7	273.0	120.3	48.6	9.1	92.5	(3)
1964	1,947.2	68.1	13.7	.2	2.2	11.3	1,747.2	680.5	355.7	461.3	205.4	44.4	9.3	108.8	--------
1965	2,132.9	64.5	10.9	(3)	(3)	10.8	1,932.3	768.0	307.8	468.2	336.7	51.7	6.8	118.3	--------
1966	2,553.8	64.1	8.7	--------	--------	8.7	2,329.0	783.4	397.9	528.8	573.6	45.2	6.6	145.1	.2
1967	2,532.7	48.0	8.1	(3)	--------	8.1	2,355.9	632.3	471.5	485.4	702.0	64.8	2.4	118.2	(3)
1968	3,841.2	53.0	12.1	--------	1.0	11.2	3,619.1	921.3	602.2	829.6	1,167.2	98.8	1.0	156.0	(3)
1969	4,290.3	40.6	11.7	.1	4.0	7.6	4,043.9	802.3	572.1	936.0	1,589.8	143.6	1.8	192.3	(3)
1970	4,168.2	24.9	10.3	(3)	1.9	8.4	3,996.3	623.6	570.9	939.6	1,787.3	75.0	.5	136.1	.1
1971	5,182.3	45.9	13.8	(3)	1.3	12.5	4,995.1	599.8	593.3	1,397.4	2,252.4	152.3	(3)	127.4	(3)
1972[4]	6,427.3	69.5	20.4	(3)	8.7	11.8	6,215.9	519.1	644.2	2,021.9	2,865.6	165.2	.1	121.3	.1

[1] Includes mixed species (not classified as hardwoods or softwoods).
[2] Data may not add to totals because of rounding.
[3] Less than 50,000 square feet.
[4] Preliminary.

Source: See source note, table 1.

TABLE 5.—*Imports of hardwood*[1] *veneer, by country of origin, 1950–72*[2]

[Million square feet, surface measure]

Year	Total	Canada	Latin America				Asia				Africa	Europe	Other
			Total	Mexico	Central America and West Indies	South America	Total	Japan	Philippines	Other Asia			
1950	361.9	348.5	2.3	(3)	2.3	(3)	0.6	0.5	0.1	----------	3.4	7.1	0.1
1951	443.2	396.5	8.2	----------	7.7	0.6	2.0	2.0	----------	----------	31.8	4.6	.1
1952	428.0	402.5	6.0	0.3	5.7	(3)	.9	.6	.3	----------	15.7	2.9	----------
1953	583.5	511.6	1.0	(3)	1.0	(3)	21.3	.3	21.0	(3)	45.0	4.4	.1
1954	584.2	524.1	2.5	2.1	.4	----------	29.0	.3	28.6	0.1	24.2	3.1	1.2
1955	765.4	674.6	6.9	6.1	.8	----------	51.2	.3	49.7	1.2	29.0	2.8	.9
1956	729.1	621.0	7.7	7.3	.4	----------	56.2	3.3	51.4	1.5	37.8	5.3	1.1
1957	502.8	373.7	9.3	4.8	4.4	(3)	77.2	7.4	69.5	.3	37.8	4.7	.1
1958	650.4	455.6	7.4	1.3	5.9	.2	153.4	82.2	70.7	.5	29.5	4.3	.2
1959	1,064.0	559.9	21.1	4.3	6.5	10.3	399.8	225.4	174.1	.3	57.7	25.5	.1
1960	840.8	472.3	22.3	5.2	5.9	11.3	225.2	19.9	205.0	.3	98.1	22.8	.1
1961	894.8	515.9	27.6	5.8	8.8	13.0	237.0	8.6	223.7	4.7	96.0	18.2	.1
1962	1,232.2	638.4	42.7	3.5	16.9	22.3	338.4	5.7	295.6	37.1	168.7	44.0	.1
1963	1,397.9	684.6	63.1	1.7	14.3	47.2	455.2	4.0	391.0	60.1	146.9	48.2	(3)
1964	1,708.3	781.3	69.8	.7	21.8	47.3	664.4	2.1	557.2	105.2	158.8	33.8	.2
1965	1,871.2	852.0	67.2	.1	19.2	47.8	687.0	4.8	527.0	155.2	219.8	44.3	.9
1966	1,843.6	792.8	96.4	.3	21.2	74.9	714.1	3.8	522.7	187.6	209.7	29.6	1.0
1967	1,796.7	755.8	140.9	.1	8.0	132.8	580.9	3.8	451.8	125.3	271.2	27.7	.2
1968	2,178.7	837.7	200.4	1.5	16.8	182.2	837.7	4.3	609.8	223.6	276.5	26.3	.1
1969	1,855.7	713.9	152.7	.6	13.1	139.0	838.6	5.3	671.4	161.9	128.1	22.2	.3
1970	1,605.8	672.4	191.0	.6	5.0	185.4	569.2	3.3	460.0	105.8	147.0	26.1	.1
1971	2,035.2	842.4	216.0	.5	15.1	200.5	809.5	4.5	590.9	214.0	143.1	24.0	.2
1972[4]	2,786.0	1,051.8	277.9	(3)	2.8	275.0	1,226.5	0.9	822.5	403.1	153.9	30.2	45.7

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[1] Includes mixed species (not classified as hardwoods or softwoods) for the years 1950–59.

[2] Data may not add to totals because of rounding.

[3] Less than 50,000 square feet.

[4] Preliminary.

Source: See source note, table 1.

TABLE 6.—*Exports of timber products, by softwoods and hardwoods and major product, 1950–72* [1]

[Million cubic feet, roundwood equivalent]

Total	Industrial roundwood used for—														
	Total			Lumber			Plywood and veneer			Pulp products [2]			Logs		
	Total	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Softwood	Hardwood
1950	140	110	30	80	65	15	(3)	(3)	(3)	50	45	5	10	5	5
1951	260	220	35	155	135	20	(3)	(3)	(3)	90	75	10	15	10	5
1952	215	170	40	115	90	25	(3)	(3)	(3)	85	75	10	10	5	5
1953	190	150	35	100	80	20	(3)	(3)	(3)	70	60	10	20	15	5
1954	270	220	50	110	90	20	(3)	(3)	(3)	135	110	20	25	15	5
1955	340	275	65	130	100	30	(3)	(3)	(3)	180	150	30	25	20	5
1956	310	250	60	120	90	30	(3)	(3)	(3)	160	135	25	30	25	5
1957	335	270	70	130	95	30	(3)	(3)	(3)	185	155	30	25	15	5
1958	310	245	65	115	85	25	(3)	(3)	(3)	165	135	30	30	20	10
1959	355	280	70	120	95	25	5	(3)	(3)	195	155	35	35	25	5
1960	455	360	90	135	110	25	(3)	(3)	(3)	275	220	55	45	35	10
1961	495	400	95	120	95	25	(3)	(3)	(3)	295	235	60	75	65	10
1962	495	400	100	120	100	20	(3)	(3)	(3)	295	230	65	85	70	15
1963	630	515	110	135	115	20	5	(3)	(3)	340	260	75	150	135	15
1964	720	595	125	150	125	20	5	(3)	5	395	305	90	170	160	10
1965	715	590	125	145	120	20	5	(3)	(3)	380	290	90	190	175	15
1966	800	665	140	160	135	25	5	5	(3)	420	320	100	220	205	15
1967	955	805	150	175	150	25	10	5	(3)	460	355	105	310	290	20
1968	1,120	955	160	180	165	15	10	5	5	525	400	125	405	385	20
1969	1,140	965	175	180	160	20	20	15	5	570	430	140	375	360	15
1970	1,355	1,150	205	200	180	20	15	10	5	710	540	170	430	420	15
1971	1,180	990	190	170	145	25	15	15	5	635	485	150	360	350	10
1972 [4]	1,330	1,130	200	225	185	40	25	20	5	590	450	140	495	475	20

[1] Columns may not add to totals because of rounding.
[2] Includes both pulpwood and the pulpwood equivalent of woodpulp, paper, and board.
[3] Less than 2.5 million cubic feet.
[4] Preliminary.

Source: Compiled from data published by U.S. Department of Commerce, Bureau of the Census. *U.S. exports, commodity by country.* FT 410 (monthly). Supt. of Documents, U.S. Government Printing Office, Washington, D.C.

TABLE 7.—*Exports of lumber, by softwoods and hardwoods and country of destination, 1950–72* [1]

[Million board feet]

Year	All species [2]						Softwoods						Hardwoods					
	Total	Canada	Europe [3]	Central and South America [4]	Japan	Other	Total	Canada	Europe [3]	Central and South America [4]	Japan	Other	Total	Canada	Europe [3]	Central and South America [4]	Japan	Other
1950	517.7	88.6	123.5	145.7	5.8	154.1	406.8	41.7	83.1	136.8	5.7	139.4	110.9	46.9	40.4	8.9	0.1	14.7
1951	997.6	134.5	336.5	176.0	18.7	302.0	875.7	71.4	324.2	164.6	18.7	296.8	121.9	63.1	42.2	11.3	----------	5.2
1952	727.3	168.6	171.8	165.3	12.0	209.7	565.7	84.7	109.4	155.3	11.9	204.2	161.6	83.8	62.3	10.0	----------	5.5
1953	643.1	161.2	93.6	144.6	58.2	185.5	512.6	75.8	71.2	136.8	58.0	170.8	130.5	85.5	22.3	7.8	.2	14.7
1954	718.0	161.1	116.3	147.5	16.0	277.2	584.7	86.3	97.4	139.3	15.9	245.9	133.3	74.9	18.9	8.2	.1	31.3
1955	841.0	218.7	145.3	173.3	29.6	274.1	652.4	119.1	95.8	147.6	29.5	260.4	188.6	99.6	49.5	25.7	.2	13.7
1956	761.3	268.6	133.5	164.2	32.9	162.2	570.7	158.9	85.8	136.6	32.8	156.6	190.5	109.7	47.6	27.5	.1	5.7
1957	811.1	237.4	122.8	171.5	47.6	231.8	623.4	138.6	88.1	148.8	47.4	200.4	187.7	98.8	34.7	22.7	.1	31.4
1958	727.2	262.1	105.2	124.3	34.6	201.0	550.1	154.8	64.5	113.2	34.4	183.2	177.1	107.3	40.7	11.1	.2	17.8
1959	787.3	333.6	98.3	120.3	52.9	182.1	607.9	198.5	80.5	104.2	52.6	172.2	179.4	135.1	17.9	16.2	.3	9.9
1960	860.7	252.9	162.9	118.5	56.3	270.1	693.8	144.7	134.6	101.2	55.7	257.7	166.9	108.2	28.4	17.4	.5	12.4
1961	773.1	232.5	152.7	87.4	147.5	153.1	618.2	150.2	108.4	80.3	146.8	132.5	154.9	82.3	44.3	7.0	.6	20.7
1962	759.7	196.9	172.0	103.7	74.1	212.9	628.6	119.3	142.3	95.6	73.5	197.9	131.1	77.6	29.7	8.1	.6	15.1
1963	874.9	186.1	232.0	99.0	114.5	243.4	743.1	107.9	198.9	92.0	112.5	231.7	131.8	78.1	33.1	6.9	2.0	11.7
1964	955.6	282.2	243.5	111.7	131.0	187.2	811.5	180.3	214.5	103.9	128.5	184.4	144.1	101.9	29.0	7.8	2.5	2.9
1965	919.1	285.1	249.4	118.8	105.7	160.1	778.9	184.0	229.3	104.8	103.1	157.7	140.2	101.1	20.1	14.0	2.6	2.4
1966	1,022.6	309.0	250.1	123.8	174.4	165.2	867.9	186.5	230.3	118.3	171.3	161.5	154.7	122.5	19.9	5.5	3.1	3.7
1967	1,129.5	338.0	261.0	116.7	265.8	147.9	965.2	207.6	241.0	112.5	260.7	143.5	164.3	130.4	20.0	4.3	5.1	4.5
1968	1,161.6	295.4	304.3	110.3	288.5	163.0	1,048.1	210.4	288.9	105.3	284.8	158.6	113.5	85.0	15.4	5.0	3.8	4.4
1969	1,142.3	285.0	278.3	109.6	317.2	152.2	1,023.8	198.3	264.6	102.5	309.6	148.9	118.4	86.7	13.7	7.1	7.7	3.3
1970	1,288.9	269.9	302.4	127.2	429.2	160.2	1,161.1	202.6	284.0	112.4	405.2	156.9	127.9	67.3	18.4	14.8	24.0	3.3
1971	1,096.6	289.3	238.9	100.5	323.1	144.7	936.2	206.3	213.8	87.6	287.4	141.1	160.3	83.0	25.2	12.9	35.7	3.6
1972 [5]	1,452.1	419.5	288.1	105.2	502.8	136.5	1,190.8	290.1	269.2	90.9	407.1	133.5	261.3	129.5	18.9	14.3	95.7	2.9

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[1] Data may not add to totals because of rounding.

[2] Excludes mixed species (not classified as softwoods or hardwoods) for the years 1950–59.

[3] Including the United Kingdom.

[4] Including Mexico.

[5] Preliminary.

Source: See source note, table 6.

TABLE 8.—*Exports of pulp products, by product, 1950–72* [1]

[Million cords, roundwood equivalent]

Year	Total	Pulpwood [2]	Woodpulp	Paper and board
1950	0.7	(3)	0.2	0.4
1951	1.2	(3)	.4	.8
1952	1.1	(3)	.4	.7
1953	.9	(3)	.3	.6
1954	1.7	(3)	.9	.8
1955	2.3	.1	1.2	1.0
1956	2.1	.1	1.0	.9
1957	2.4	.1	1.2	1.1
1958	2.1	.1	1.0	1.0
1959	2.5	.1	1.3	1.1
1960	3.6	.2	2.2	1.2
1961	3.8	.2	2.2	1.4
1962	3.8	.1	2.3	1.4
1963	4.4	.1	2.7	1.6
1964	5.1	.1	3.0	2.1
1965	5.0	.2	2.7	2.2
1966	5.6	.3	2.9	2.4
1967	6.5	.6	3.4	2.6
1968	7.9	1.2	3.5	3.2
1969	9.0	1.7	3.9	3.4
1970	10.9	1.8	5.7	3.4
1971	9.6	1.5	3.4	4.7
1972 [4]	9.5	2.0	3.5	4.0

[1] Data may not add to totals because of rounding.
[2] Roundwood and chips.
[3] Less than 50 thousand cords.
[4] Preliminary.

Source: See source note, table 6.

TABLE 9.—*Exports of logs, by major species, 1950–72* [1]

[Million board feet, log scale]

Year	Total	Softwoods				Hardwoods		
		Total	Douglas-fir	Port Orford cedar	Other	Total	Walnut	Other
1950	48.2	28.9	1.0	0.3	27.6	19.3	1.0	18.3
1951	79.4	57.9	2.4	.6	54.9	21.5	1.0	20.5
1952	63.7	44.4	4.2	1.9	38.3	19.2	.3	18.9
1953	115.1	86.0	12.4	3.5	70.0	29.2	.5	28.6
1954	139.5	106.4	12.8	13.8	79.8	33.1	.6	32.5
1955	166.2	144.2	9.8	10.7	123.7	22.0	1.2	20.8
1956	187.7	154.9	15.8	13.9	125.2	32.8	1.1	31.6
1957	139.3	107.3	8.1	22.8	76.4	32.0	1.4	30.6
1958	169.8	127.3	12.4	32.3	82.7	42.5	2.3	40.2
1959	204.6	167.6	20.8	39.2	107.7	37.0	3.7	33.2
1960	266.3	210.3	27.5	37.2	145.6	56.0	10.2	45.9
1961	481.8	432.2	66.8	61.2	304.2	49.5	7.2	42.4
1962	522.2	452.7	48.1	41.5	363.1	69.5	10.3	59.2
1963	951.3	879.6	71.6	63.9	744.1	71.8	16.5	55.3
1964	1,086.3	1,022.6	94.6	37.0	891.0	63.7	11.1	52.6
1965	1,192.8	1,111.4	111.3	39.1	961.0	81.4	23.6	57.9
1966	1,393.1	1,317.5	130.5	43.0	1,144.0	75.6	12.8	62.8
1967	1,970.7	1,873.6	272.0	34.6	1,567.0	97.1	16.4	80.7
1968	2,568.1	2,473.2	396.5	38.4	2,038.3	94.9	21.9	73.0
1969	2,397.0	2,316.8	380.6	40.7	1,895.6	80.2	20.6	59.5
1970	2,753.0	2,684.1	487.7	54.1	2,142.3	68.9	17.4	51.5
1971	2,292.4	2,233.4	448.1	40.2	1,745.1	59.0	12.9	46.2
1972 [2]	3,143.3	3,049.4	662.2	45.1	2,942.4	93.9	15.2	78.7

[1] Data may not add to totals because of rounding.
[2] Preliminary.

Source: See source note, table 6.

TABLE 10.—*Exports of logs, by major region of destination, 1950–72* [1]

[Million board feet, log scale]

Year	Total	Canada	Western Europe	Japan	Other
1950	48.2	42.5	3.6	----------	2.1
1951	79.4	71.8	4.7	1.4	1.6
1952	63.7	53.8	3.0	6.5	.4
1953	115.1	69.2	3.8	41.6	.6
1954	139.5	75.4	4.8	54.5	4.7
1955	166.2	138.4	8.9	18.0	.8
1956	187.7	160.2	5.7	20.5	1.2
1957	139.3	97.1	5.3	36.0	1.0
1958	169.8	112.6	7.7	47.9	1.6
1959	204.6	126.6	7.2	70.1	.7
1960	266.3	150.7	15.9	98.6	1.1
1961	481.8	99.6	16.3	364.8	1.1
1962	522.2	167.3	24.8	329.0	1.2
1963	951.3	209.3	32.2	691.1	18.8
1964	1,086.3	288.5	19.0	755.4	23.4
1965	1,192.8	352.9	29.4	804.4	6.2
1966	1,393.1	266.2	17.3	1,083.0	26.5
1967	1,970.7	335.8	20.8	1,583.6	30.6
1968	2,568.1	341.8	28.8	2,119.2	78.4
1969	2,397.0	324.6	29.9	2,007.8	34.8
1970	2,753.2	291.8	23.6	2,377.3	60.3
1971	2,292.4	343.6	20.8	1,847.1	80.9
1972 [2]	3,143.3	518.1	32.6	2,529.9	61.7

[1] Data may not add to totals because of rounding.
[2] Preliminary.

Source: See source note, table 6.

TABLE 11.—*Imports and exports of timber products, by product, 1940–72*[1]

[Million cubic feet, roundwood equivalent]

Year	Total				Lumber			Pulpwood and veneer			Pulp products[2]			Logs		
	Export	Imports	Net imports		Imports	Exports	Net imports	Imports	Exports	Net imports	Imports	Exports	Net imports	Imports	Exports	Net imports
			Volume	Percent of U.S. consumption												
1940	715	290	425	3.8	115	150	−35	(3)	5	−5	565	125	440	35	10	25
1941	865	220	645	5.2	210	110	100	(3)	5	−5	600	100	500	55	5	50
1942	880	175	705	6.0	240	70	170	(3)	5	−5	610	95	515	30	5	25
1943	715	150	565	5.2	135	50	85	(3)	15	−15	560	80	480	20	5	15
1944	695	135	560	5.1	155	55	100	(3)	10	−10	515	65	450	25	5	20
1945	835	150	685	6.7	165	70	95	(3)	10	−10	645	65	580	25	5	20
1946	970	155	815	7.3	195	100	95	(3)	5	−5	750	50	700	25	(3)	25
1947	1,115	300	815	7.0	205	210	−5	(3)	10	−10	880	70	810	30	10	20
1948	1,260	165	1,095	9.0	295	100	195	(3)	(3)	(3)	920	55	865	45	10	35
1949	1,105	170	935	8.4	245	105	140	(3)	(3)	(3)	830	55	775	30	10	20
1950	1,520	140	1,380	11.3	535	80	455	5	(3)	5	935	50	885	45	10	−35
1951	1,465	260	1,205	9.9	390	155	235	10	(3)	10	1,025	90	935	35	15	−20
1952	1,375	215	1,160	9.7	385	115	270	10	(3)	10	945	85	860	30	10	−20
1953	1,420	190	1,230	10.3	430	100	330	15	(4)	15	935	70	865	40	20	−20
1954	1,460	270	1,190	10.1	480	110	370	30	(3)	30	920	135	785	35	25	−10
1955	1,610	340	1,270	10.4	560	130	430	40	(3)	40	975	180	795	35	25	−10
1956	1,640	310	1,330	10.6	530	120	410	45	(3)	45	1,040	160	880	30	30	0
1957	1,490	335	1,155	10.2	460	130	330	45	(3)	45	960	185	775	25	25	0
1958	1,495	310	1,185	10.6	530	115	415	50	(3)	50	895	165	730	15	30	15
1959	1,700	355	1,345	11.1	635	120	515	75	5	70	970	195	775	20	35	15
1960	1,675	455	1,220	10.7	610	135	475	60	(3)	60	985	275	710	20	45	25
1961	1,745	495	1,250	11.2	665	120	545	60	(3)	60	1,000	295	705	20	75	55
1962	1,910	495	1,415	12.2	760	120	640	75	(3)	75	1,055	295	760	20	85	65
1963	1,990	630	1,360	11.4	830	135	695	80	5	75	1,060	340	720	15	150	135
1964	2,035	720	1,315	10.6	815	150	665	90	5	85	1,120	395	725	10	170	160
1965	2,100	715	1,385	10.8	815	145	670	100	5	95	1,175	380	795	10	190	180
1966	2,230	800	1,430	11.1	810	160	650	115	5	110	1,290	420	870	15	220	205
1967	2,160	955	1,205	9.7	800	175	625	110	10	100	1,240	460	780	15	310	295
1968	2,395	1,120	1,275	9.9	960	180	780	165	10	155	1,260	525	735	15	405	390
1969	2,515	1,140	1,375	10.7	980	180	800	180	20	160	1,340	570	770	15	375	360
1970	2,420	1,355	1,065	8.4	955	200	755	170	15	155	1,275	710	565	25	430	405
1971	2,745	1,180	1,565	11.6	1,185	170	1,015	210	15	195	1,335	635	700	15	360	345
1972[4]	2,945	1,330	1,615	11.6	1,470	225	1,245	265	25	240	1,205	590	615	5	495	490

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[1] Data may not add to totals because of rounding.

[2] Includes both pulpwood and the pulpwood equivalent of woodpulp, paper, and board.

[3] Less than 2.5 million cubic feet.

[4] Preliminary.

Sources: See source notes, tables 1 and 6.

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TABLE 1.—*Measures of population and economic growth, 1920–72*

Year	Population	Gross national product	Per capita gross national product	Disposable personal income	Per capita disposable personal income	Index of manufacturing production
	Millions	*Billions of 1967 dollars*	*1967 dollars*	*Billions of 1967 dollars*	*1967 dollars*	*1967=100*
1920	106.5	160.5	1,507			16.2
1921	108.5	145.4	1,340			12.3
1922	110.1	166.5	1,512			16.2
1923	112.0	186.8	1,668			18.9
1924	114.1	186.2	1,632			17.7
1925	115.8	201.8	1,743			19.8
1926	117.4	212.8	1,813			20.9
1927	119.0	213.3	1,792			20.7
1928	120.5	216.7	1,798			21.8
1929	121.8	239.4	1,966	172.3	1,415	22.8
1930	123.2	215.8	1,752	159.0	1,291	18.7
1931	124.1	199.1	1,604	153.0	1,233	15.3
1932	124.9	169.6	1,358	131.7	1,054	11.8
1933	125.7	166.4	1,324	128.4	1,021	14.0
1934	126.5	181.4	1,434	137.7	1,089	15.3
1935	127.4	199.3	1,564	150.8	1,184	18.0
1936	128.2	226.9	1,770	169.8	1,324	21.5
1937	129.0	238.9	1,852	175.2	1,358	23.4
1938	130.0	226.8	1,745	164.3	1,264	18.0
1939	131.0	246.2	1,879	178.4	1,362	21.5
1940	132.6	267.1	2,014	190.3	1,435	25.4
1941	133.9	310.1	2,316	217.7	1,626	32.4
1942	135.4	350.2	2,586	244.1	1,803	37.8
1943	137.3	396.4	2,887	254.9	1,857	47.0
1944	138.9	424.8	3,058	265.0	1,908	50.9
1945	140.5	417.6	2,972	262.8	1,870	42.6
1946	141.9	367.6	2,591	259.7	1,830	35.3
1947	144.7	364.4	2,518	249.4	1,724	39.4
1948	147.2	380.6	2,586	262.9	1,786	40.9
1949	149.8	381.1	2,544	264.1	1,763	38.7
1950	152.3	417.8	2,743	285.6	1,875	45.0
1951	154.9	450.8	2,910	292.5	1,888	48.6
1952	157.6	464.6	2,948	301.2	1,911	50.6
1953	160.2	485.4	3,030	315.1	1,967	55.1
1954	163.0	478.6	2,936	318.4	1,953	51.5
1955	165.9	515.0	3,104	339.5	2,046	58.2
1956	168.9	524.5	3,105	353.9	2,095	60.5
1957	172.0	532.0	3,093	361.3	2,101	61.2
1958	174.9	525.9	3,007	364.7	2,085	56.9
1959	177.8	559.6	3,147	381.0	2,143	64.1
1960	180.7	573.4	3,173	389.2	2,154	65.4
1961	183.7	584.6	3,182	401.2	2,184	65.6
1962	186.5	622.9	3,340	420.2	2,253	71.4
1963	189.2	647.9	3,424	436.2	2,305	75.8
1964	191.9	683.3	3,561	466.7	2,432	81.2
1965	194.3	726.4	3,739	497.7	2,562	89.1
1966	196.6	773.8	3,936	525.0	2,670	98.3
1967	198.7	793.9	3,995	546.3	2,749	100.0
1968	200.7	830.8	4,140	570.8	2,844	105.7
1969	202.7	853.2	4,209	587.6	2,899	110.7
1970	204.9	849.0	4,143	610.0	2,977	106.6
1971	207.0	872.1	4,213	634.6	3,066	106.8
1972	208.8	928.3	4,446	662.0	3,170	114.3

NOTE: Conversion to 1967 dollars by U.S. Department of Agriculture, Forest Service.

Sources: Population, U.S. Department of Commerce, Bureau of the Census. 1920–59—*Population estimates and projections*. Curr. Pop. Reps. Ser. P–25, No. 442, 1970; 1960–72—*Population estimates and projections*, Curr. Pop. Reps. Ser. P–25, No. 499, 1973.

Gross national product and per capita gross national product, 1920–28—U.S. Congress, Joint Committee on the Economic Report. *Potential economic growth of the United States during the next decade.* 83d Cong., 2d sess., 1954; 1929–72—*Economic report of the President.* 1973.

Disposable personal income, 1929–72—*Economic report of the President.* 1972.

Per capita disposable income, 1929–72—Computed by the Forest Service.

Index of manufacturing production, 1929–72—*Economic report of the President.* 1973.

TABLE 2.—*Average stumpage and lumber prices of Douglas-fir, southern pine, and ponderosa pine 1910–72*

[Prices in constant 1967 dollars per thousand board feet, International ¼-inch log rule for stumpage and mill tally for lumber]

Year	Douglas-fir		Ponderosa pine		Southern pine	
	Stumpage	Lumber	Stumpage	Lumber	Stumpage	Lumber
1910	4.42	35.98	8.15	39.17	3.44	36.53
1911	5.03	33.03	6.15	40.71	6.99	41.45
1912	4.61	31.75	6.10	37.34	3.44	39.37
1913	3.45	23.89	5.03	32.22	3.94	26.94
1914	3.33	23.04	4.68	29.87	6.89	47.22
1915	5.92	29.57	5.75	39.98	4.90	34.65
1916	1.99	24.44	5.41	32.92	6.06	32.49
1917	1.93	26.86	2.99	32.32	4.69	31.35
1918	1.95	27.78	3.29	30.88	3.71	36.08
1919	2.46	34.46	3.46	38.84	4.33	40.19
1920	1.65	43.43	3.83	48.63	4.61	45.06
1921	2.76	35.84	5.24	53.55	6.14	38.59
1922	3.67	41.98	6.61	55.66	4.69	47.45
1923	3.52	51.97	6.18	63.72	4.83	57.42
1924	3.18	43.71	5.70	54.89	5.79	52.55
1925	2.88	39.25	5.56	51.93	5.01	49.60
1926	3.11	39.05	5.90	51.56	5.82	51.38
1927	3.71	39.46	5.68	52.83	5.93	48.22
1928	4.24	38.08	4.12	52.75	6.02	49.25
1929	4.02	40.83	6.04	53.91	5.95	52.26
1930	5.41	37.93	6.65	52.76	6.00	47.24
1931	5.64	32.04	9.20	54.46	7.55	45.18
1932	3.70	31.68	6.38	50.31	6.97	39.70
1933	2.58	39.88	6.78	54.58	6.63	52.64
1934	2.84	41.77	5.33	53.08	6.27	56.00
1935	3.01	38.69	4.79	49.42	9.11	44.18
1936	3.69	42.42	4.35	52.40	10.23	49.83
1937	2.63	44.22	4.07	55.14	~~9.95~~	49.86
1938	4.51	42.66	5.08	54.83	15.05	46.91
1939	4.04	45.03	4.97	57.20	12.18	49.53
1940	4.15	48.09	4.47	59.93	9.27	52.68
1941	5.84	56.49	4.75	63.59	20.02	56.60
1947	9.46	83.73	8.93	75.94	11.90	89.91
1948	17.56	88.28	14.51	87.63	16.54	91.10
1949	10.31	81.22	18.42	88.15	20.91	86.61
1950	14.66	96.32	18.42	96.57	27.26	93.44
1951	20.38	94.63	30.36	101.58	31.71	89.94
1952	21.29	96.35	25.47	103.06	36.30	93.44
1953	16.90	89.92	24.41	105.49	32.70	93.91
1954	13.53	91.39	25.58	99.70	28.33	89.54
1955	24.05	99.57	24.47	103.30	30.43	92.85
1956	30.40	96.02	24.70	107.16	34.46	93.09
1957	20.53	83.94	21.36	95.05	28.20	86.98
1958	16.84	81.22	16.62	90.26	27.45	84.48
1959	28.38	92.42	17.89	98.01	31.01	87.14
1960	24.65	84.40	16.57	92.80	30.36	85.68
1961	21.35	81.22	10.54	85.66	23.68	82.33
1962	18.89	83.37	13.98	87.36	22.91	82.00
1963	21.58	86.87	13.76	89.02	22.18	81.98
1964	29.41	88.15	16.52	89.65	24.52	81.90
1965	32.24	85.76	16.88	87.91	27.41	81.74
1966	36.62	86.98	16.34	88.17	32.30	86.92
1967	30.49	89.73	18.28	87.04	31.99	86.60
1968	43.63	105.17	24.25	99.29	34.38	96.02
1969	56.43	110.99	54.89	120.98	40.55	102.29
1970	27.72	88.44	23.90	98.59	33.46	89.81
1971	31.51	108.40	27.71	112.65	38.32	101.73
1972	43.99	121.74	45.47	127.63	46.06	110.15

Sources: Douglas-fir stumpage, 1910–31 National Forest timber sales, all species Washington and Oregon; 1932–41, all species western Washington and western Oregon; 1947–56, National Forest and Bureau of Land Management sales, Douglas-fir only in western Washington and western Oregon; 1957–72 National Forest sales, Douglas-fir only in western Washington and western Oregon.

Southern pine stumpage, 1910–34 prices of privately owned second-growth southern pine timber; 1935–49 National Forest timber sales, all species; 1950–72 National Forest sales, pine only.

Ponderosa pine stumpage, 1910–72 National timber sales, California.

Lumber prices, Forest Service estimates based on data published by the Bureau of Labor Statistics, the western Wood Products Association, and unpublished information collected by the Forest Service's Division of Timber Management.

Note: All U.S. Forest Service National Forest prices in this table are the bid prices (including KV payments) for timber sold on a Scribner Decimal C log rule basis and adjusted to International ¼-inch log rule units comparable to sawtimber removals. Prices exclude timber sold by land exchanges and from land utilization project lands.

TABLE 3.—*Relative wholesale price index of lumber, 1800–1972* [1]

[1967=100]

Year	All lumber	Year	All lumber	Year	All lumber	Year	All lumber	Year	All lumber	Year	All lumber
1800	6.4	1830	11.2	1860	20.5	1890	30.2	1920	53.8	1950	105.9
1801	6.6	1831	11.2	1861	19.9	1891	29.7	1921	46.0	1951	102.8
1802	8.0	1832	11.1	1862	18.2	1892	30.9	1922	51.6	1952	103.0
1803	6.8	1833	11.6	1863	17.4	1893	30.5	1923	56.0	1953	103.5
1804	6.8	1834	12.8	1864	17.4	1894	33.7	1924	51.0	1954	101.6
1805	7.0	1835	11.3	1865	16.2	1895	31.5	1925	49.1	1955	107.5
1806	7.1	1836	10.3	1866	20.3	1896	33.2	1926	48.7	1956	106.4
1807	7.6	1837	14.7	1867	21.6	1897	32.2	1927	47.7	1957	97.4
1808	7.4	1838	15.4	1868	22.3	1898	32.5	1928	45.4	1958	94.5
1809	7.0	1839	14.6	1869	21.8	1899	33.3	1929	48.0	1959	101.7
1810	6.5	1840	16.1	1870	22.3	1900	34.4	1930	48.2	1960	97.0
1811	6.5	1841	16.7	1871	23.6	1901	35.0	1931	46.6	1961	92.4
1812	6.1	1842	16.5	1872	24.0	1902	34.3	1932	43.9	1962	93.8
1813	5.5	1843	16.2	1873	24.4	1903	36.3	1933	52.3	1963	96.5
1814	4.7	1844	17.0	1874	24.1	1904	33.9	1934	54.9	1964	98.0
1815	8.2	1845	18.8	1875	23.0	1905	36.0	1935	49.8	1965	97.3
1816	9.1	1846	17.7	1876	23.6	1906	42.6	1936	52.4	1966	100.3
1817	8.0	1847	17.1	1877	23.8	1907	40.6	1937	56.4	1967	100.0
1818	7.5	1848	17.9	1878	23.8	1908	38.9	1938	54.1	1968	114.5
1819	8.6	1849	18.1	1879	25.5	1909	36.2	1939	58.9	1969	123.5
1820	9.6	1850	19.0	1880	24.8	1910	34.4	1940	63.7	1970	103.0
1821	9.5	1851	18.3	1881	26.6	1911	36.9	1941	68.4	1971	119.0
1822	9.0	1852	20.1	1882	27.0	1912	37.3	1942	65.6	1972	133.8
1823	9.7	1853	19.4	1883	26.8	1913	38.9	1943	66.6		
1824	9.8	1854	19.0	1884	28.7	1914	37.0	1944	71.7		
1825	10.2	1855	20.0	1885	29.[illegible]	1915	35.3	1945	71.3		
1826	10.9	1856	20.5	1886	30.3	1916	32.4	1946	71.8		
1827	11.0	1857	21.1	1887	30.4	1917	30.9	1947	93.3		
1828	11.5	1858	21.0	1888	29.6	1918	32.1	1948	97.9		
1829	11.4	1859	20.5	1889	29.6	1919	41.1	1949	94.3		

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[1] Derived by dividing the actual price index by the all commodities price index.

Sources: 1800–1914—Cornell University Agricultural Experiment Station. *Wholesale prices for 213 years, 1720 to 1932.* Memoir 142, 1932, Part I, table 49 pp. 107–119.

1915–1972—U.S. Department of Labor, Bureau of Labor Statistics. *Wholesale prices and price indexes.* Monthly.

TABLE 4.—*Wholesale price indexes of selected timber products and competing materials, 1926–1972*

[1967=100]

Year	All commodities	Lumber and wood products		Lumber		Softwood lumber		Hardwood lumber		Millwork		Softwood plywood	
		Actual	Relative [1]	Actual	Relative [1]	Actual	Relative [1]	Actual	Relative [1]	Actual	Relative [1]	Actual	Relative [1]
1926	51.6	26.5	51.4	25.2	48.8	----------	----------	----------	----------	30.0	58.1	----------	----------
1927	49.3	25.0	50.7	23.5	47.7	----------	----------	----------	----------	30.0	60.9	----------	----------
1928	50.0	24.1	48.2	22.7	45.4	----------	----------	----------	----------	29.9	59.8	----------	----------
1929	49.1	25.0	50.9	23.6	48.1	----------	----------	----------	----------	30.1	61.3	----------	----------
1930	44.6	22.9	51.3	21.5	48.2	----------	----------	----------	----------	28.4	63.7	----------	----------
1931	37.6	18.6	49.5	17.5	46.5	----------	----------	----------	----------	23.8	63.3	----------	----------
1932	33.6	16.0	47.6	14.8	44.0	----------	----------	----------	----------	23.4	69.6	----------	----------
1933	34.0	19.0	55.9	17.8	52.4	----------	----------	----------	----------	24.6	72.4	----------	----------
1934	38.6	22.3	57.8	21.2	54.9	----------	----------	----------	----------	25.6	66.3	----------	----------
1935	41.3	21.4	51.8	20.6	49.9	----------	----------	----------	----------	25.3	61.3	----------	----------
1936	41.7	22.4	53.7	21.9	52.5	----------	----------	----------	----------	27.2	65.2	----------	----------
1937	44.5	26.5	59.6	25.1	56.4	----------	----------	----------	----------	32.6	73.3	----------	----------
1938	40.5	24.1	59.5	22.0	54.3	----------	----------	----------	----------	29.3	72.3	----------	----------
1939	39.8	24.8	62.3	23.4	58.8	----------	----------	----------	----------	28.8	72.4	----------	----------
1940	40.5	27.4	67.7	25.8	63.7	----------	----------	----------	----------	31.4	77.5	----------	----------
1941	45.1	32.7	72.5	30.8	68.3	----------	----------	----------	----------	35.8	79.4	----------	----------
1942	50.9	35.6	69.9	33.4	65.6	----------	----------	----------	----------	39.2	77.0	----------	----------
1943	53.3	37.7	70.7	35.5	66.6	----------	----------	----------	----------	39.5	74.1	----------	----------
1944	53.6	40.6	75.7	38.5	71.8	----------	----------	----------	----------	40.7	75.9	----------	----------
1945	54.6	41.2	75.5	38.9	71.2	----------	----------	----------	----------	41.0	75.1	----------	----------
1946	62.3	47.2	75.8	44.7	71.7	----------	----------	----------	----------	46.3	74.3	----------	----------
1947	76.5	73.4	95.9	71.5	93.5	72.5	94.8	68.3	89.3	59.4	77.6	114.6	149.8
1948	82.8	84.0	101.4	81.2	98.1	82.8	100.0	76.6	92.5	71.7	86.6	147.6	178.3
1949	78.7	77.7	98.7	74.3	94.4	75.8	96.3	69.6	88.4	73.4	93.3	128.0	162.6
1950	81.8	89.3	109.2	86.6	105.9	88.1	107.7	82.1	100.4	78.2	95.6	148.0	180.9
1951	91.1	97.2	106.7	93.7	102.9	95.6	104.9	88.2	96.8	88.7	97.4	157.5	172.9
1952	88.6	94.4	106.5	91.3	103.0	95.2	107.4	81.2	91.6	86.5	97.6	143.5	162.0
1953	87.4	94.3	107.9	90.5	103.5	93.2	106.6	82.8	94.7	89.6	102.5	144.0	164.8
1954	87.6	92.6	105.7	88.9	101.5	91.8	104.8	81.0	92.5	88.9	101.5	139.3	159.0
1955	87.8	97.1	110.6	94.5	107.6	97.7	111.3	85.7	97.6	87.7	99.9	143.4	163.3
1956	90.7	98.5	108.6	96.5	106.4	98.5	108.6	91.1	100.4	88.0	97.0	131.2	144.7
1957	93.3	93.5	100.2	90.9	97.4	92.6	99.2	86.3	92.5	87.4	93.7	118.6	127.1
1958	94.6	92.4	97.7	89.5	94.6	90.8	96.0	86.3	91.2	87.3	92.3	119.5	126.3
1959	94.8	98.8	104.2	96.4	101.7	98.7	104.1	89.9	94.8	92.6	97.7	127.3	134.3
1960	94.9	95.3	100.4	92.2	97.2	92.7	97.7	90.8	95.7	93.1	98.1	113.2	119.3
1961	94.5	91.0	96.3	87.4	92.5	87.9	93.0	86.2	91.2	90.8	96.1	110.0	116.4
1962	94.8	91.6	96.6	89.0	93.9	90.1	95.0	86.0	90.7	90.7	95.7	106.3	112.1
1963	94.5	93.5	98.9	91.2	96.5	92.1	97.5	88.8	94.0	92.7	98.1	108.9	115.2
1964	94.7	95.4	100.7	92.9	98.1	93.3	98.5	92.2	97.4	96.7	102.1	105.6	111.5
1965	96.6	95.9	99.3	94.0	97.3	93.1	96.4	97.4	100.8	96.0	99.4	105.7	109.4
1966	99.8	100.2	100.4	100.1	100.3	97.7	97.9	108.7	108.9	98.0	98.2	106.2	106.4
1967	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1968	102.5	113.3	110.5	117.4	114.5	120.6	117.7	104.3	101.8	105.6	103.0	129.2	126.0
1969	106.5	125.3	117.6	131.5	123.5	134.4	126.2	120.1	112.8	117.8	110.6	139.1	130.6
1970	110.4	113.7	103.0	113.7	103.0	113.4	102.7	114.7	103.9	116.0	105.1	113.6	102.9
1971	113.9	127.0	111.5	135.5	119.0	141.0	123.8	113.5	99.6	120.7	106.0	127.2	111.7
1972	119.1	144.3	121.2	159.4	133.8	167.7	140.8	126.2	106.0	128.4	107.8	154.9	130.1

See footnotes at end of table.

TABLE 4.—*Wholsale price indexes of selected timber products and competing materials, 1926–1972*—Continued

[1967=100]

Year	Hardwood plywood		Paperboard		Container board		Insulation board		Hardboard Type II		Particleboard	
	Actual	Relative [1]	Actual	Relative [1]	Actual	Relative [1]	Actual	Relative [1]	Actual	Relative [1]	Actual	Relative [1]
1926	------	------	38.8	75.2	------	------	------	------	------	------	------	------
1927	------	------	40.8	82.8	------	------	------	------	------	------	------	------
1928	------	------	37.7	75.4	------	------	------	------	------	------	------	------
1929	------	------	34.4	70.1	------	------	------	------	------	------	------	------
1930	------	------	28.8	64.6	------	------	------	------	------	------	------	------
1931	------	------	24.4	64.9	------	------	------	------	------	------	------	------
1932	------	------	24.3	72.3	------	------	------	------	------	------	------	------
1933	------	------	31.9	93.8	------	------	------	------	------	------	------	------
1934	------	------	36.6	94.8	------	------	------	------	------	------	------	------
1935	------	------	32.0	77.5	------	------	------	------	------	------	------	------
1936	------	------	32.1	77.0	------	------	------	------	------	------	------	------
1937	------	------	37.8	84.9	------	------	------	------	------	------	------	------
1938	------	------	32.0	79.0	------	------	------	------	------	------	------	------
1939	------	------	32.9	82.7	------	------	------	------	------	------	------	------
1940	------	------	37.6	92.8	------	------	------	------	------	------	------	------
1941	------	------	42.2	93.6	------	------	------	------	------	------	------	------
1942	------	------	43.4	85.3	------	------	------	------	------	------	------	------
1943	------	------	46.8	87.8	------	------	------	------	------	------	------	------
1944	------	------	47.9	89.4	------	------	------	------	------	------	------	------
1945	------	------	49.9	91.4	------	------	------	------	------	------	------	------
1946	------	------	54.8	88.0	------	------	------	------	------	------	------	------
1947	99.0	129.4	76.7	100.3	84.8	110.8	71.6	93.6	------	------	------	------
1948	103.3	124.8	78.8	95.2	85.4	103.1	79.2	95.7	------	------	------	------
1949	90.8	115.4	76.4	97.1	85.7	108.9	80.3	102.0	------	------	------	------
1950	99.0	121.0	81.2	99.3	87.6	107.1	82.8	101.2	------	------	------	------
1951	108.3	118.9	101.9	111.9	100.5	110.3	87.3	95.8	------	------	------	------
1952	98.9	111.6	98.5	111.2	98.6	111.3	88.9	100.3	------	------	------	------
1953	105.8	121.1	96.1	110.0	99.9	114.3	93.4	106.9	------	------	------	------
1954	98.0	111.9	96.2	109.8	102.2	116.7	98.3	112.2	------	------	------	------
1955	100.2	114.1	98.2	111.8	102.2	116.4	100.7	114.7	------	------	------	------
1956	102.3	112.8	104.2	114.9	105.4	116.2	105.4	116.2	------	------	------	------
1957	101.3	108.6	105.4	113.0	106.6	114.3	108.9	116.7	------	------	------	------
1958	102.0	107.8	105.3	111.3	106.6	112.7	111.3	117.7	101.3	107.1	------	------
1959	103.8	109.5	105.2	111.0	106.6	112.4	114.3	120.6	102.2	107.8	------	------
1960	105.2	110.9	104.6	110.2	106.2	111.9	113.9	120.0	101.5	107.0	------	------
1961	103.8	109.8	97.4	103.1	97.2	102.9	112.6	119.2	102.0	107.9	------	------
1962	100.1	105.6	98.0	103.4	98.5	103.9	105.4	111.2	102.9	108.5	------	------
1963	99.6	105.4	99.7	105.5	100.9	106.8	103.0	109.0	103.8	109.8	------	------
1964	100.8	106.4	101.5	107.2	103.9	109.7	100.4	106.0	102.2	107.9	------	------
1965	100.5	104.0	101.5	105.1	103.9	107.6	98.2	101.7	102.1	105.7	------	------
1966	101.3	101.5	102.2	102.4	103.9	104.1	98.7	98.9	101.9	102.1	108.3	108.5
1967	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1968	100.5	98.0	95.9	93.6	93.1	90.8	103.3	100.8	98.3	95.9	101.5	99.0
1969	104.0	97.7	99.4	93.3	97.2	91.3	109.0	102.3	99.8	93.7	120.5	113.1
1970	102.9	93.2	101.1	91.6	99.3	89.9	110.8	100.4	102.8	93.1	85.7	77.6
1971	100.7	88.4	102.4	89.9	100.3	88.1	115.1	101.1	101.1	88.8	84.2	73.9
1972	104.3	87.6	105.5	88.6	103.9	87.2	119.0	99.9	102.2	85.8	85.3	71.6

TABLE 4.—*Wholesale price indexes of selected timber products and competing materials, 1926–1972*—Continued

[1967=100]

Year	Metals and metal products		Structural shapes		Metal doors, sash and trim		Aluminum siding noninsulated		Galvanized carbon steel sheets		Flat glass		Concrete products	
	Actual	Relative [1]	Actual	Relative [1]	Actual	Relative [1]	Actual	Relative [1]	Actual	Relative [1]	Actual	Relative [1]	Actual	Relative [1]
1926	41.4	80.2	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	70.5	136.6
1927	38.8	78.7	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	70.5	143.0
1928	38.8	77.6	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	70.5	141.0
1929	40.2	81.9	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	69.4	141.3
1930	36.2	81.2	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	70.4	157.8
1931	32.6	86.7	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	66.3	176.3
1932	29.9	89.0	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	61.2	182.1
1933	30.7	90.3	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	62.1	182.6
1934	33.9	87.8	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	62.1	160.9
1935	33.8	81.8	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	56.7	137.3
1936	34.5	82.7	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	60.3	144.6
1937	39.4	88.5	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	60.6	136.2
1938	38.0	93.8	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	55.6	137.3
1939	37.6	94.5	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	55.4	139.2
1940	37.8	93.3	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	49.3	121.7
1941	38.5	85.4	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	57.3	127.1
1942	39.1	76.8	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	59.2	116.3
1943	40.0	75.0	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	59.2	111.1
1944	40.0	74.6	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	59.2	110.4
1945	39.6	72.5	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	59.2	108.4
1946	44.3	71.1	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	62.7	100.6
1947	54.9	71.8	39.5	51.6	71.9	94.0	---------	---------	51.6	67.5	66.8	87.3	71.3	93.2
1948	62.5	75.5	48.1	58.1	75.1	90.7	---------	---------	58.4	70.5	70.4	85.0	74.7	90.2
1949	63.0	80.1	52.8	67.1	76.7	97.5	---------	---------	61.0	77.5	73.9	93.9	96.4	97.1
1950	66.3	81.1	56.6	69.2	82.0	100.2	---------	---------	67.9	83.0	75.6	92.4	78.2	95.6
1951	73.8	81.0	60.0	65.9	90.1	98.9	---------	---------	75.2	82.5	80.3	88.1	83.3	91.4
1952	73.9	83.4	61.3	69.2	87.8	99.1	---------	---------	75.1	84.8	80.5	90.9	83.4	94.1
1953	76.3	87.3	64.7	74.0	91.4	104.6	---------	---------	73.3	83.9	85.0	97.3	85.5	97.8
1954	76.9	87.8	67.3	76.8	96.5	110.2	---------	---------	74.7	85.3	87.6	100.0	87.1	99.4
1955	82.1	93.5	71.0	80.9	103.9	118.3	---------	---------	79.0	90.0	90.1	102.6	88.0	100.2
1956	89.2	98.3	76.2	84.0	108.5	119.6	---------	---------	84.5	93.2	93.9	103.5	91.1	100.4
1957	91.0	97.5	87.7	94.0	104.8	112.3	---------	---------	86.9	93.1	95.5	102.4	93.6	100.3
1958	90.4	95.6	91.4	96.6	105.7	111.7	---------	---------	89.2	94.3	95.3	100.7	94.9	100.3
1959	92.3	97.4	93.4	98.5	100.7	106 2	---------	---------	91.8	96.8	95.2	100.4	96.1	101.4
1960	92.4	97.4	93.4	98.4	98.9	104.2	---------	---------	93.0	98.0	93.3	98.3	97.2	102.4
1961	91.9	97.2	93.4	98.8	98.4	104.1	108.7	115.0	93.0	98.4	92.3	97.7	97.2	102.9
1962	91.2	96.2	93.4	98.5	97.9	103.3	102.2	107.8	93.0	98.1	92.5	97.6	97.3	102.6
1963	91.3	96.6	94.1	99.5	95.5	101.1	98.9	104.7	95.6	101.2	93.7	99.2	96.5	102.1
1964	93.8	99.0	96.2	101.6	96.0	101.4	100.1	105.7	96.8	102.2	97.6	103.1	95.7	101.1
1965	96.4	99.8	96.2	99.6	95.4	98.8	98.2	101.7	100.0	103.5	96.2	99.6	96.3	99.7
1966	98.8	99.0	99.9	100.1	95.9	96.1	102.4	102.6	100.0	100.2	96.0	96.2	97.7	97.9
1967	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1968	102.6	100.1	101.8	99.3	103.9	101.4	100.3	97.9	102.7	100.2	104.4	101.9	102.6	100.1
1969	108.5	101.9	108.1	101.5	108.4	101.8	100.9	94.7	105.7	99.2	109.2	102.5	106.5	100.0
1970	116.7	105.7	115.3	104.4	112.9	102.3	104.6	94.7	109.7	99.4	115.5	104.6	112.2	101.6
1971	119.0	104.5	126.8	111.3	118.0	103.6	105.2	92.4	114.9	100.9	123.9	108.8	120.6	105.9
1972	123.5	103.7	134.6	113.0	120.5	101.2	105.8	88.8	122.1	102.5	122.4	102.8	125.6	105.5

[1] Relative wholesale price indexes obtained by dividing the actual price index by the all commodity wholesale price index.

Source: U.S. Department of Labor, Bureau of Labor Statistics, *Wholesale prices and price indexes*. Monthly.

Table 4.—*Wholesale price indexes of selected timber products and competing materials, 1926–1972*—Continued

[1967=100]

Year	Building brick		Clay tile		Prepared asphalt roofing		Paper		Gypsum products		Asbestos cement shingles, siding shingles		Hard surface floor coverings	
	Actual	Relative [1]	Actual	Relative [1]	Actual	Relative [1]	Actual	Relative [1]	Actual	Relative [1]	Actual	Relative [1]	Actual	Relative [1]
1926	---	---	---	---	83.5	161.8	45.0	87.2	---	---	---	---	---	---
1927	---	---	---	---	78.8	159.8	41.1	83.4	---	---	---	---	---	---
1928	---	---	---	---	70.6	141.2	40.7	81.4	---	---	---	---	---	---
1929	---	---	---	---	62.2	126.7	40.0	81.5	---	---	---	---	---	---
1930	---	---	---	---	63.7	142.8	39.9	89.5	---	---	---	---	---	---
1931	---	---	---	---	66.0	175.5	38.6	102.7	---	---	---	---	---	---
1932	---	---	---	---	60.4	179.8	36.2	107.7	---	---	---	---	---	---
1933	---	---	---	---	61.9	182.1	34.5	101.5	---	---	---	---	---	---
1934	---	---	---	---	66.7	172.8	36.0	93.3	---	---	---	---	---	---
1935	---	---	---	---	69.9	169.2	36.2	87.7	---	---	---	---	---	---
1936	---	---	---	---	68.9	165.2	36.4	87.3	---	---	---	---	---	---
1937	---	---	---	---	75.3	169.2	38.6	86.7	---	---	---	---	---	---
1938	---	---	---	---	60.9	150.4	39.4	97.3	---	---	---	---	---	---
1939	---	---	---	---	63.0	158.3	38.5	96.7	---	---	---	---	---	---
1940	---	---	---	---	68.7	169.6	40.3	99.5	---	---	---	---	---	---
1941	---	---	---	---	70.9	157.2	42.3	93.8	---	---	---	---	---	---
1942	---	---	---	---	69.1	135.8	43.4	85.3	---	---	---	---	---	---
1943	---	---	---	---	69.0	129.5	44.5	83.5	---	---	---	---	---	---
1944	---	---	---	---	69.7	130.3	45.5	84.9	---	---	---	---	---	---
1945	---	---	---	---	71.0	130.0	45.9	84.1	---	---	---	---	---	---
1946	---	---	---	---	74.3	119.3	50.2	80.6	---	---	---	---	---	---
1947	58.9	77.0	69.2	90.5	84.7	110.7	59.5	77.8	70.3	91.9	47.2	61.7	81.3	106.3
1948	66.1	79.8	72.2	87.2	92.8	112.1	65.5	79.1	76.8	92.8	53.6	64.7	82.5	99.6
1949	69.0	87.7	74.1	94.2	92.6	117.7	66.3	84.2	76.1	96.7	55.7	70.8	79.9	101.5
1950	71.5	87.4	76.6	93.6	91.2	111.5	67.9	83.0	77.8	95.1	58.2	71.1	78.1	95.5
1951	76.2	83.6	82.5	90.6	94.4	103.6	76.0	83.4	87.4	95.9	60.8	66.7	83.4	91.5
1952	75.9	85.7	82.6	93.2	92.6	104.5	79.1	89.3	87.5	98.8	61.7	69.6	86.9	98.1
1953	77.1	88.2	83.8	95.9	96.6	110.5	80.1	91.6	90.1	103.1	65.3	74.7	89.4	102.3
1954	78.1	89.2	85.6	97.7	93.7	107.0	80.8	92.2	90.9	103.8	68.2	77.9	91.8	104.8
1955	81.0	92.3	88.2	100.5	95.5	108.8	82.8	94.3	90.9	103.5	71.6	81.5	93.9	106.9
1956	85.9	94.7	91.4	100.8	100.5	110.8	87.6	96.6	94.6	104.3	77.2	85.1	98.9	109.0
1957	87.0	93.2	91.6	98.2	110.1	118.0	90.5	97.0	94.6	101.4	81.3	87.1	99.6	106.8
1958	87.7	92.7	92.4	97.7	101.6	107.4	90.7	95.9	98.2	103.8	84.6	89.4	98.3	103.9
1959	89.9	94.8	93.9	99.1	104.9	110.7	91.5	96.5	99.0	104.4	87.4	92.2	98.2	103.6
1960	91.3	96.2	95.7	100.8	96.6	101.8	92.7	97.7	99.1	104.4	91.6	96.5	99.9	105.3
1961	91.5	96.8	96.4	102.0	104.0	110.1	92.9	98.3	101.0	106.9	93.7	99.2	101.2	107.1
1962	92.5	97.6	96.9	102.2	100.0	105.5	93.3	98.4	102.1	107.7	93.8	98.9	97.8	103.2
1963	93.6	99.0	96.9	102.5	94.9	100.4	93.1	98.5	102.5	108.5	93.8	99.3	99.0	104.8
1964	94.4	99.7	96.4	101.8	93.7	98.9	94.2	99.5	105.3	111.2	93.8	99.0	100.9	106.5
1965	95.6	99.0	96.7	100.1	98.0	101.4	94.6	97.9	101.2	104.8	95.7	99.1	101.7	105.3
1966	98.3	98.5	97.9	98.1	102.6	102.8	97.5	97.7	99.6	99.8	97.3	97.5	100.9	101.1
1967	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1968	103.4	100.9	102.5	100.0	104.0	101.5	102.0	99.5	102.6	100.1	103.2	100.7	104.2	101.7
1969	107.8	101.2	105.9	99.4	105.8	99.3	105.5	99.1	103.5	97.2	108.2	101.6	100.9	94.7
1970	112.2	101.6	108.7	98.5	101.8	92.2	111.0	100.5	100.0	90.6	116.4	105.4	101.0	91.5
1971	117.4	103.1	112.4	98.7	126.5	111.1	114.1	100.2	106.8	93.8	120.7	106.0	104.2	91.5
1972	122.1	102.5	114.5	96.1	133.4	112.0	116.3	97.7	114.7	96.3	122.8	103.1	104.5	87.7

TABLE 5.—*Panel products consumed per housing unit, by type of unit, 1970, with projections (1970 relative prices) to 2000*

Year	Hardboard (1/8-inch basis)			Insulation board (1/2-inch basis)			Particleboard (3/4-inch basis)		
	One- and two-family	Multifamily	Mobile homes	One- and two-family	Multifamily	Mobile homes	One- and two-family	Multifamily	Mobile homes
	Square feet	*Square feet*	*Square feet*	*Square feet*	*Square feet*	*Square feet*	*Square feet*	*Square feet*	*Square feet*
1970	1,000	40	170	935	40	710	250	55	560
Projections									
1980	1,500	45	200	855	35	600	420	70	650
1990	1,740	50	240	775	30	550	590	85	715
2000	1,920	60	290	720	20	520	740	100	790

TABLE 6.—*Per capita expenditures for new nonresidential construction [1] by construction class, 1920–70, with projections to 2000*

Year	All classes		Buildings				Utilities, water and sewer systems [4]		Highways		All other [5]	
			Commercial [2]		Other [3]							
	Expenditures	Annual rate of change	Expenditures	Annual rate of change	Expenditures	Annual rate of change	Expenditures	Annual rate of change	Expenditures	Annual rate of change	Expenditures	Annual rate of change
	1967 dollars	*Percent*	*1967 dollars*	*Percent*	*1967 dollars*	*Percent*	*1967 dollars*	*Percent*	*1967 dollars*	*Percent*	*1967 dollars*	*Percent*
1920	109	-----------	19	-----------	48	-----------	21	-----------	9	-----------	13	-----------
1925	175	9.9	32	11.0	69	7.5	37	12.0	17	13.6	20	9.0
1930	191	1.8	28	−2.6	69	.0	40	1.6	28	10.5	26	5.4
1935	91	−13.8	8	−22.2	25	−18.4	13	−20.1	16	−10.6	30	2.9
1940	135	8.2	11	6.6	41	10.4	24	13.1	25	9.3	35	3.1
1945	82	−9.5	5	−14.6	36	−2.6	14	−10.2	5	−27.5	22	−8.9
1950	157	13.9	17	27.7	58	10.0	41	24.0	21	33.2	21	−.9
1955	202	5.2	29	11.3	78	6.1	39	−1.0	31	8.1	25	3.6
1960	210	.8	29	.0	79	.3	38	−.5	37	3.6	27	1.6
1965	253	3.8	35	3.8	104	5.7	44	3.0	43	3.1	27	.0
1966	264	4.3	34	−2.9	112	7.7	47	6.8	44	2.3	27	.0
1967	258	−.4	32	−5.9	107	−4.5	48	2.1	43	−2.3	27	.0
1968	262	−.4	36	12.5	100	−7.0	55	14.6	44	2.3	27	.0
1969	258	−1.5	40	11.1	100	0.0	52	−5.5	40	−9.1	26	−3.7
1970	242	−6.2	38	−5.0	88	−11.1	54	3.8	38	−5.0	24	−7.7
Low projections												
1980	327	[6] 2.0	50	[6] 2.0	133	[6] 2.2	62	[6] 2.4	51	[6] 1.5	31	[6] 1.4
1990	396	2.0	62	2.2	163	2.1	79	2.5	56	.9	36	1.5
2000	487	2.1	78	2.3	201	2.1	106	3.0	61	.9	41	1.3
Medium projections												
1980	337	[6] 2.3	52	[6] 2.4	137	[6] 2.5	64	[6] 2.7	52	[6] 1.7	32	[6] 1.7
1990	417	2.1	65	2.3	172	2.3	84	2.8	59	1.3	37	1.5
2000	517	2.2	83	2.5	214	2.2	112	2.9	65	1.0	43	1.5
High projections												
1980	344	[6] 2.5	53	[6] 2.6	140	[6] 2.7	65	[6] 2.9	53	[6] 1.9	33	[6] 2.0
1990	431	2.3	68	2.5	178	2.4	86	2.8	61	1.4	38	1.4
2000	542	2.3	87	2.5	224	2.3	118	3.2	68	1.1	45	1.7

[1] Excludes expenditures for farm construction.

[2] Includes private commercial buildings such as offices, stores, warehouses, and restaurants.

[3] Includes public and private nonhousekeeping, industrial, educational, religious, hospital and institutional, and similar miscellaneous buildings.

[4] Includes telephone and telegraph, other public utilities, sewer systems, and water supply facilities.

[5] Includes military facilities, conservation and development, railroad construction except tract construction, and all other public and private construction not included in other categories.

[6] Rates of increase calculated from the following 1970 trend values: all classes $268; commercial buildings, $41; noncommercial, $107; utilities, water and sewer systems, $49; highways, $44; and all other, $27.

Note: Annual rates of increase are calculated for 5-year periods from 1920 through 1965, for 1-year periods 1965 through 1970, and for 10-year periods 1970 through 2000.

NOTE: Data may not add to totals because of rounding.

Sources: Calculated from information shown in text tables 114 and 125.

TABLE 7.—*Lumber used in new nonresidential construction,*[1] *by construction class, 1962 and 1970, with projections (1970 relative prices) to 2000*

Year	All classes		Buildings				Utilities, water and sewer systems [4]		Highways		All other [5]	
			Commercial [2]		Noncommercial [3]							
	Total	Use per 1,000 dollars of expenditure [6]	Total	Use per 1,000 dollars of expenditure [6]	Total	Use per 1,000 dollars of expenditure [6]	Total	Use per 1,000 dollars of expenditure [6]	Total	Use per 1,000 dollars of expenditure [6]	Total	Use per 1,000 dollars of expenditure [6]
	Million board feet	*Board feet*	*Million board feet*	*Board feet*	*Million board feet*	*Board feet*	*Million board feet*	*Board feet*	*Million board feet*	*Board feet*	*Million board feet*	*Board feet*
1962	3,040	75	350	58	1,570	104	480	70	350	46	290	60
1970	2,610	53	380	49	970	54	660	60	270	35	330	67
Low projections												
1980	2,920	39	410	36	1,170	39	700	50	260	23	380	54
1990	3,360	34	480	31	1,340	33	850	43	280	20	410	47
2000	3,880	30	540	26	1,550	29	1,040	37	310	19	440	41
Medium projections												
1980	3,030	39	420	36	1,220	39	730	50	270	23	390	54
1990	3,630	34	520	31	1,450	33	920	43	300	20	440	47
2000	4,360	30	600	26	1,740	29	1,170	37	350	19	500	41
High projections												
1980	3,150	39	440	36	1,270	39	750	50	280	23	410	54
1990	3,920	34	560	31	1,560	33	990	43	330	20	480	47
2000	4,890	30	680	26	1,950	29	1,310	37	390	19	560	41

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[1] Excludes farm construction.

[2] Includes private commercial buildings such as offices, stores, warehouses, and restaurants.

[3] Includes public and private nonhousekeeping, industrial, educational, religious, hospital and institutional, and similar miscellaneous buildings.

[4] Includes telephone and telegraph, other public utilities, sewer systems, and water supply facilities.

[5] Includes military facilities, conservation and development, railroad construction except track construction, and all other public and private construction not included in other categories.

[6] 1967 dollars. Use per 1,000 dollars of construction expenditure for 1962 and 1970 computed by Forest Service. (See table 125 for construction expenditures.)

Sources: Lumber, 1962 and 1970, estimates based on Forest Service Surveys except highways, which were adapted from data provided by U.S. Department of Transportation, Bureau of Public Roads.

Projections: U.S. Department of Agriculture, Forest Service.

TABLE 8.—*Plywood used in new nonresidential construction*[1] *by construction class, 1962 and 1970, with projections (1970 relative prices) to 2000*

[⅜-inch basis]

Year	All classes		Buildings				Utilities, water and sewer systems[4]		Highways		All other[5]	
			Commercial[2]		Noncommercial[3]							
	Total	Use per 1,000 dollars of expenditure[6]	Total	Use per 1,000 dollars of expenditure[6]	Total	Use per 1,000 dollars of expenditure[6]	Total	Use per 1,000 dollars of expenditure[6]	Total	Use per 1,000 dollars of expenditure[6]	Total	Use per 1,000 dollars of expenditure[6]
	Million square feet	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*
1962	1,280	32	220	37	570	37	130	19	280	37	80	11
1970	1,700	34	170	22	900	50	180	16	360	46	90	19
						Low projections						
1980	2,580	35	190	17	1,660	55	220	16	380	33	130	19
1990	3,260	33	230	15	2,190	54	280	14	390	28	170	20
2000	4,050	31	290	14	2,780	52	340	12	410	25	230	21
						Medium projections						
1980	2,680	35	200	17	1,720	55	230	16	390	33	140	19
1990	3,530	33	250	15	2,370	54	300	14	420	28	190	20
2000	4,550	31	340	14	3,120	52	380	12	460	25	250	21
						High projections						
1980	2,800	35	210	17	1,790	55	240	16	410	33	150	19
1990	3,800	33	270	15	2,550	54	320	14	460	28	200	20
2000	5,100	31	370	14	3,500	52	420	12	520	25	290	21

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[1] Excludes farm construction.

[2] Includes private commercial buildings such as offices, stores, warehouses, and restaurants.

[3] Includes public and private nonhousekeeping, industrial, educational, religious, hospital and institutional, and similar miscellaneous buildings.

[4] Includes telephone and telegraph, other public utilities, sewer systems, and water supply facilities.

[5] Includes military facilities, conservation and development, railroad construction except track construction, and all other public and private construction not included in other categories.

[6] 1967 dollars. Use per 1,000 dollars of construction expenditure for 1962 and 1970 computed by Forest Service. (See table 125 for construction expenditures.)

Sources: Plywood use, 1962 and 1970, estimates based on Forest Service Surveys except highways, which were adapted from data provided by U.S. Department of Transportation, Bureau of Public Roads.

Projections: U.S. Department of Agriculture, Forest Service.

TABLE 9.—*Building board [1] used in new nonresidential construction [2] by construction class, 1962 and 1970, with projections (1970 relative prices) to 2000*

[½-inch basis]

Year	All classes		Buildings				Utilities, water and sewer systems [5]		Highways		All other [6]	
			Commercial [3]		Noncommercial [4]							
	Total	Use per 1,000 dollars of expenditures [7]	Total	Use per 1,000 dollars of expenditures [7]	Total	Use per 1,000 dollars of expenditures [7]	Total	Use per 1,000 dollars of expenditures [7]	Total	Use per 1,000 dollars of expenditures [7]	Total	Use per 1,000 dollars of expenditures [7]
	Million square feet	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*
1962	430	11	90	15	300	20	5	0.7	10	1.3	25	5.1
1970	720	14	155	20	500	28	20	1.8	15	1.9	30	6.3
						Low projections						
1980	1,030	14	200	18	730	24	20	1.4	20	1.8	60	8.6
1990	1,280	13	250	16	920	23	20	1.0	20	1.4	70	8.0
2000	1,420	11	280	14	1,020	19	20	.7	20	1.2	80	7.4
						Medium projections						
1980	1,080	14	210	18	770	24	20	1.4	20	1.8	60	8.6
1990	1,380	13	270	16	1,000	23	20	1.0	20	1.4	70	8.0
2000	1,600	11	320	14	1,150	19	20	.7	20	1.2	80	7.4
						High projections						
1980	1,120	14	220	18	790	24	20	1.4	20	1.8	60	8.6
1990	1,490	13	290	16	1,080	23	20	1.0	20	1.4	70	8.0
2000	1,790	11	360	14	1,290	19	20	.7	20	1.2	80	7.4

[1] Includes hardboard, particleboard, and insulation board.

[2] Excludes farm construction.

[3] Includes private commercial buildings such as offices, stores, warehouses, and restaurants.

[4] Includes public and private nonhousekeeping, industrial, educational, religious, hospitals and institutional, and similar miscellaneous buildings.

[5] Includes telephone and telegraph, other public utilities, sewer systems, and water supply facilities.

[6] Includes military facilities, conservation and development, railroad construction, except track construction, and all other public and private construction not included in other categories.

[7] 1967 dollars. Use per 1,000 dollars of construction expenditures for 1962 and 1970 computed by Forest Service. (See table 125 for construction expenditures.)

Note: Data may not add to totals because of rounding.

Sources: Building board use 1962 and 1970 estimates based on Forest Service surveys, except highways, which were adapted from data provided by U.S. Department of Transportation, Bureau of Public Roads.

Projections: U.S. Department of Agriculture, Forest Service.

TABLE 10.—*Per capita value of manufacturing shipments, specified years 1948–70, by product group, with projections to 2000*

Year	All products		Household furniture		Commercial and institutional furniture		Consumer goods [1]		Commercial and industrial equipment [2]		Other products [3]	
	Value	Annual rate of increase	Value	Annual rate of increase	Value	Annual rate of increase	Value	Annual rate of increase	Value	Annual rate of increase	Value	Annual rate of increase
	1967 dollars	*Percent*	*1967 dollars*	*Percent*	*1967 dollars*	*Percent*	*1967 dollars*	*Percent*	*1967 dollars*	*Percent*	*1967 dollars*	*Percent*
1948	1,657	------------	16.43	------------	4.04	------------	16.58	------------	172.95	------------	1,447	------------
1950	1,741	1.6	17.90	4.4	5.00	11.2	18.61	5.9	183.96	3.1	1,516	2.4
1955	2,126	4.1	21.37	3.6	6.84	6.5	17.96	−.7	236.22	5.1	1,845	4.0
1960	2,107	−.2	20.89	−.5	7.97	3.1	20.27	2.4	264.83	2.4	1,794	−.6
1965	2,560	3.9	24.95	3.6	10.10	4.8	23.87	3.3	362.38	6.5	2,139	3.6
1966	2,682	4.8	25.60	2.6	11.21	11.0	24.92	4.4	406.01	12.0	2,214	3.5
1967	2,738	3.8	25.61	------------	11.67	4.1	25.05	.5	422.15	4.0	2,254	1.8
1968	2,868	3.1	27.60	7.8	11.57	.9	25.78	2.9	427.32	1.2	2,375	5.4
1969	2,960	3.2	27.93	1.2	12.61	9.0	28.10	9.0	441.54	3.3	2,450	3.2
1970	2,880	2.7	25.83	−7.5	11.59	−8.1	26.52	−5.6	413.88	−6.3	2,402	−2.0
1948–70	------------	2.5	------------	2.1	------------	4.9	------------	2.2	------------	4.1	------------	2.3
Low projections												
1980	3,789	[4] 2.5	36.77	[4] 2.5	17.50	[4] 3.1	35.33	[4] 2.8	675.85	[4] 3.9	3,024	[4] 2.2
1990	4,829	2.5	45.92	2.2	23.60	3.0	44.98	2.4	974.94	3.7	3,740	2.2
2000	6,246	2.6	57.53	2.2	31.64	3.0	58.02	2.6	1,413.02	3.3	4,686	2.3
Medium projections												
1980	3,978	[4] 3.1	37.88	[4] 2.8	18.42	[4] 3.7	36.39	[4] 3.0	709.25	[4] 4.4	3,176	[4] 2.7
1990	5,268	2.8	48.24	2.5	25.46	3.3	47.25	2.6	1,062.86	4.1	4,084	2.6
2000	6,989	2.9	61.16	2.4	35.35	3.3	61.67	2.7	1,586.12	4.1	5,245	2.5
High projections												
1980	4,147	[4] 3.5	39.19	[4] 3.1	19.30	[4] 4.2	37.17	[4] 3.3	744.67	[4] 4.9	3,307	[4] 3.1
1990	5,685	3.2	50.60	2.6	27.94	3.8	48.92	2.8	1,163.14	4.6	4,394	2.9
2000	7,836	3.3	64.90	2.5	40.23	3.7	64.61	2.8	1,806.35	4.5	5,859	2.9

[1] Includes sporting goods, musical instruments, boat building and repair, toys and games, luggage and trunks, handles, morticians' goods, shoe and boot findings, and wood matches.

[2] Includes commercial refrigeration, signs and displays, patterns and jigs, truck bodies and trailers, general machinery, agricultural implements, electrical equipment, and textile machinery supplies.

[3] All manufactured products except those listed above and products such as pallets, prefabricated wooden buildings and structural members, containers, mobile homes, millwork, flooring and other similar goods included in the construction and shipping sections of this study.

[4] Rates of increase calculated from the following 1970 trend values: all products, $2963.38; household furniture, $28.81; commercial and institutional furniture, $12.84; consumer goods, $26.86; commercial and industrial equipment, $459.96; other products, $2435.06.

Note: Conversion to 1967 dollars by U.S. Department of Agriculture, Forest Service. Annual rates of increase are calculated for 5-year periods from 1950 through 1965, for 1-year periods 1965 through 1970, and for 10-year periods 1970 through 2000.

Note: Data may not add to totals because of rounding.

Source: Calculated from information shown in text tables 114 and 129.

TABLE 11.—*Lumber use in manufacturing, by product group, specified years 1948–70, with projections (1970 relative prices) to 2000*

Year	All products		Household furniture		Commercial and institutional furniture		Consumer goods [1]		Commercial and industrial equipment [2]		Other products [3]	
	Total	Per dollar of shipments [4]	Total	Per dollar of shipments [4]	Total	Per dollar of shipments [4]	Total	Per dollar of shipments [4]	Total	Per dollar of shipments [4]	Total	Per dollar of shipments [4]
	Million board feet	*Board feet*	*Million board feet*	*Board feet*	*Million board feet*	*Board feet*	*Million board feet*	*Board feet*	*Million board feet*	*Board feet*	*Million board feet*	*Board feet*
1948	3,924	0.016	1,970	0.814	321	0.540	723	0.296	518	0.020	392	0.0018
1960	3,864	.010	2,116	.560	289	.201	643	.176	414	.009	403	.0001
1965	4,609	.009	2,987	.612	280	.142	518	.111	619	.009	205	.0005
1970	4,670	.008	2,961	.558	271	.114	621	.114	620	.007	197	.0004
							Low projections					
1980	5,480	0.006	3,450	0.415	330	0.084	740	0.092	760	0.005	200	0.0003
1990	6,290	.005	3,830	.336	380	.064	880	.079	970	.004	230	.0002
2000	7,140	.004	4,250	.278	440	.052	1,030	.067	1,130	.003	290	.0002
							Medium projections					
1980	5,720	0.006	3,580	0.415	350	0.084	760	0.092	810	0.005	220	0.0003
1990	6,850	.005	4,130	.336	420	.064	950	.079	1,090	.004	260	.0002
2000	8,130	.004	4,780	.278	510	.052	1,160	.067	1,340	.003	340	.0002
							High projections					
1980	6,040	0.006	3,780	0.415	380	0.084	790	0.092	860	0.005	230	0.0003
1990	7,560	.005	4,520	.336	480	.064	1,030	.079	1,240	.004	290	.0002
2000	9,360	.004	5,390	.278	630	.052	1,300	.067	1,630	.003	410	.0002

[1] Includes sporting goods, musical instruments, boat building and repair, toys and games, luggage and trunks, handles, morticians' goods, shoe and boot findings, and wood matches.

[2] Includes commercial refrigeration, signs and displays, patterns and jigs, truck bodies and trailers, general machinery, agricultural implements, electrical equipment, and textile machinery supplies.

[3] All manufactured products except those listed above and products such as pallets, prefabricated wooden buildings, and structural members, containers, mobile homes, millwork, flooring and other similar goods included in the construction and shipping sections of this study.

[4] 1967 dollars. Use per dollar of shipments in the 1948–70 period computed by Forest Service. (See table 129 for value of shipments.)

Note: Data may not add to totals because of rounding.

Sources: Lumber use, U.S. Department of Agriculture, Forest Service. 1948—*Wood used in manufacture, 1948.* Forest Resource Rep. 2, 1951; 1960—*Wood used in manufacturing industries, 1960.* Statist. Bull. 353, 1965; 1965—*Wood used in manufacturing industries, 1965.* Statist. Bull. 440, 1969; 1970—Estimates based on preliminary value of shipments (table 129) and trends in timber products use per dollar of shipments.

Projections: U.S. Department of Agriculture, Forest Service.

TABLE 12.—*Veneer and plywood (3/8-inch basis) use in manufacturing, by product group, specified years 1948–70, with projections (1970 relative prices) to 2000*

Year	All products		Household furniture		Commercial and institutional furniture		Consumer goods [1]		Commercial and industrial equipment [2]		Other products [3]	
	Total	Per dollar of shipments [4]	Total	Per dollar of shipments [4]	Total	Per dollar of shipments [4]	Total	Per dollar of shipments [4]	Total	Per dollar of shipments [4]	Total	Per dollar of shipments [4]
	Million square feet	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*
1948	1,126	0.005	592	0.245	274	0.461	57	0.023	73	0.003	130	0.0006
1960	1,822	.005	877	.232	342	.238	246	.067	75	.002	282	.0009
1965	1,562	.003	789	.163	230	.117	273	.059	170	.002	100	.0002
1970	1,656	.003	838	.158	227	.095	303	.056	179	.002	109	.0002
						Low projections						
1980	2,290	0.003	1,160	0.140	280	0.070	380	0.047	320	0.002	150	0.0002
1990	2,950	.002	1,460	.128	330	.056	470	.042	510	.002	180	.0002
2000	3,760	.002	1,780	.116	380	.044	600	.039	750	.002	250	.0002
						Medium projections						
1980	2,400	0.003	1,210	0.140	300	0.070	390	0.047	340	0.002	160	0.0002
1990	3,220	.002	1,570	.128	360	.056	510	.042	570	.002	210	.0002
2000	4,300	.002	1,990	.116	440	.044	680	.039	890	.002	300	.0002
						High projections						
1980	2,530	0.003	1,270	0.140	320	0.070	410	0.047	360	0.002	170	0.0002
1990	3,570	.002	1,720	.128	420	.056	550	.042	650	.002	230	.0002
2000	5,010	.002	2,270	.116	540	.044	760	.039	1,090	.002	350	.0002

[1] Includes sporting goods, musical instruments, boat building and repair, toys and games, luggage and trunks, handles, morticians' goods, shoe and boot findings, and wood matches.

[2] Includes commercial refrigeration, signs and displays, patterns and jigs, truck bodies and trailers, general machinery, agricultural implements, electrical equipment, and textile machinery supplies.

[3] All manufactured products except those listed above and products such as pallets, prefabricated wooden buildings and structural members, containers, mobile homes, millwork, flooring and other similar goods included in the construction and shipping sections of this study.

[4] 1967 dollars. Use per dollar of shipments in the 1948-70 period computed by Forest Service. (See table 129 for value of shipments.)

Sources: Veneer and plywood use, U.S. Department of Agriculture, Forest Service. 1948—*Wood used in manufacture, 1948.* Forest Resource Rep. 2, 1951; 1960—*Wood used in manufacturing industries, 1960.* Statist. Bull. 353, 1965; 1965—*Wood used in manufacturing industries, 1965.* Statis. Bull. 440, 1969; 1970—Estimates based on preliminary value of shipments (table 129) and trends in timber products use per dollar of shipments.

Projections: U.S. Department of Agriculture, Forest Service.

TABLE 13.—*Hardboard (⅛-inch basis) use in manufacturing, by product group, specified years 1960–70, with projections (1970 relative prices) to 2000*

Year	All products		Household furniture		Commercial and institutional furniture		Consumer goods [1]		Commercial and industrial equipment [2]		Other products [3]	
	Total	Per dollar of shipments [4]	Total	Per dollar of shipments [4]	Total	Per dollar of shipments [4]	Total	Per dollar of shipments [4]	Total	Per dollar of shipments [4]	Total	Per dollar of shipments [4]
	Million square feet	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*
1960	760	0.0020	231	0.061	145	0.101	30	0.012	58	0.0022	296	0.0009
1965	1,135	.0023	526	.108	138	.070	43	.009	41	.0006	387	.0009
1970	1,361	.0023	663	.125	127	.053	48	.009	49	.0006	474	.0009
Low projections												
1980	2,140	0.0025	1,140	0.138	150	0.038	80	0.009	90	0.0006	680	0.0010
1990	3,050	.0025	1,650	.145	200	.037	110	.009	140	.0006	950	.0010
2000	4,230	.0025	2,260	.148	240	.028	150	.010	230	.0006	1,350	.0011
Medium projections												
1980	2,240	0.0025	1,190	0.138	160	0.038	80	0.009	100	0.0006	710	0.0010
1990	3,350	.0025	1,780	.145	220	.037	110	.009	160	.0006	1,080	.0010
2000	4,850	.0025	2,540	.148	280	.028	170	.010	270	.0006	1,590	.0011
High projections												
1980	2,370	0.0025	1,250	0.138	170	0.038	80	0.009	110	0.0006	760	0.0010
1990	3,720	.0025	1,950	.145	250	.037	130	.009	190	.0006	1,200	.0010
2000	5,650	.0025	2,890	.148	340	.028	190	.010	320	.0006	1,910	.0011

[1] Includes sporting goods, musical instruments, boat building and repair, toys and games, luggage and trunks, handles, morticians' goods, shoe and boot findings, and wood matches.

[2] Includes commercial refrigeration, signs and displays, patterns and jigs, truck bodies and trailers, general machinery, agricultural implements, electrical equipment, and textile machinery supplies.

[3] All manufactured products except those listed above and products such as pallets, prefabricated wooden buildings and structural members, containers, mobile homes, millwork, flooring and other similar goods included in the construction and shipping sections of this study.

[4] 1967 dollars. Use per dollar of shipments in the 1960–70 period computed by Forest Service. (See table 129 for value of shipments.)

Sources: Wood used, U.S. Department of Agriculture, Forest Service. 1948—*Wood used in manufacture, 1948.* Forest Resource Rep. 2, 1951; 1960—*Wood used in manufacturing industries 1960.* Statist. Bull. 353, 1965; 1965—*Wood used in manufacturing industries, 1965.* Statist. Bull. 440, 1969; 1970—Estimates based on preliminary value of shipments (table 129) and trends in timber products use per dollar of shipments.

Projections: U.S. Department of Agriculture, Forest Service.

TABLE 14.—*Particleboard (¾-inch basis) use in manufacturing, by product group, specified years 1960–70, with projections (1970 relative prices) to 2000*

Year	All products		Household furniture		Commercial and institutional furniture		Consumer goods [1]		Commercial and industrial equipment [2]		Other products [3]	
	Total	Per dollar of shipments [4]	Total	Per dollar of shipments [4]	Total	Per dollar of shipments [4]	Total	Per dollar of shipments [4]	Total	Per dollar of shipments [4]	Total	Per dollar of shipments [4]
	Million square feet	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*
1960	106	0.0003	58	0.0153	34	0.0236	5	0.0014	7	0.0001	2	(5)
1965	476	.0010	312	.0642	119	.0605	10	.0022	16	.0002	19	0.0001
1970	669	.0011	427	.0800	179	.0750	14	.0026	19	.0002	30	.0001
						Low projections						
1980	1,330	0.0016	830	0.1000	400	0.1000	20	0.0028	30	0.0002	70	0.0001
1990	2,100	.0018	1,280	.1125	660	.1130	30	.0029	50	.0002	80	.0001
2000	3,090	.0019	1,840	.1200	1,010	.1200	50	.0030	70	.0002	120	.0001
						Medium projections						
1980	1,400	0.0015	870	0.1000	420	0.1000	20	0.0028	30	0.0002	60	0.0001
1990	2,300	.0017	1,380	.1125	730	.1123	40	.0029	50	.0002	100	.0001
2000	3,540	.0018	2,060	.1200	1,190	.1200	50	.0030	90	.0002	150	.0001
						High projections						
1980	1,480	0.0015	910	0.1000	450	0.1000	20	0.0028	40	0.0002	60	0.0001
1990	2,560	.0017	1,510	.1125	840	.1123	40	.0029	60	.0002	110	0.001
2000	4,140	.0018	2,340	.1200	1,450	.1200	60	.0030	110	.0002	180	0.001

[1] Includes sporting goods, musical instruments, boat building and repair, toys and games, luggage and trunks, handles, morticians' goods, shoe and boot findings, and wood matches.

[2] Includes commercial refrigeration, signs and displays, patterns and jigs, truck bodies and trailers, general machinery, agricultural implements, electrical equipment, and textile machinery supplies.

[3] All manufactured products except those listed above and products such as pallets, prefabricated wooden buildings and structural members, containers, mobile homes, millwork, flooring and other similar goods included in the construction and shipping sections of this study.

[4] 1967 dollars. Use per dollar of shipments in the 1948–70 period computed by Forest Service. (See table 129 for value of shipments.)

[5] Negligible.

Note: Data may not add to totals because of rounding.

Sources: Wood use, U.S. Department of Agriculture, Forest Service 1948—*Wood used in manufacture, 1948*. Forest Resource Rep. 2, 1951; 1960—*Wood used in manufacturing industries, 1960*. Statist. Bull. 353, 1965; 1965—*Wood used in manufacturing industries, 1965*. Statist. Bull. 440, 1969; 1970—Estimates based on preliminary value of shipments (table 129) and trends in timber products use per dollar of shipments.

Per dollar value of shipments computed by Forest Service based on total value of shipments, table 129.

Projections: U.S. Department of Agriculture, Forest Service.

TABLE 15.—*Lumber consumption, exports, imports, and domestic production, 1920–72*

Year	Domestic consumption				Exports			Imports			Domestic production		
	Total	Per capita	Softwoods [1]	Hardwoods	Total	Softwoods [1]	Hardwoods	Total	Softwoods [1]	Hardwoods	Total	Softwoods	Hardwoods
	Billion board feet	*Board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*
1920	34.6	325	27.4	7.2	1.7	1.5	0.2	1.4	1.3	(2)	35.0	27.6	7.4
1921	28.5	263	23.0	5.5	1.3	1.2	.1	.8	.8	(2)	29.0	23.4	5.6
1922	34.9	317	28.8	6.1	2.0	1.7	.3	1.6	1.5	(2)	35.2	28.9	6.3
1923	40.5	362	32.9	7.6	2.5	2.2	.3	2.0	1.9	0.1	41.0	33.2	7.8
1924	38.5	337	30.8	7.7	2.7	2.4	.3	1.7	1.7	.1	39.5	31.5	8.0
1925	40.2	347	32.8	7.5	2.6	2.2	.4	1.8	1.7	.1	41.0	33.3	7.7
1926	38.8	330	31.4	7.4	2.8	2.5	.4	1.9	1.8	.1	39.8	32.1	7.7
1927	35.9	302	29.0	7.0	3.1	2.6	.4	1.7	1.6	.1	37.3	30.0	7.3
1928	35.0	290	28.5	6.5	3.2	2.8	.5	1.5	1.4	.1	36.8	29.9	6.9
1929	37.1	305	29.5	7.6	3.2	2.7	.5	1.5	1.4	.1	38.7	30.8	7.9
1930	28.2	229	22.5	5.8	2.4	1.9	.4	1.2	1.2	(2)	29.4	23.2	6.1
1931	19.0	153	15.2	3.8	1.7	1.4	.3	.7	.7	(2)	20.0	15.9	4.1
1932	12.7	102	10.3	2.5	1.2	.9	.2	.4	.4	(2)	13.5	10.8	2.7
1933	16.2	130	13.1	3.1	1.3	1.0	.3	.4	.3	(2)	17.2	13.8	3.4
1934	17.8	141	13.8	3.9	1.3	1.1	.3	.3	.3	(2)	18.8	14.6	4.2
1935	22.1	173	17.6	4.5	1.3	1.0	.3	.4	.4	.1	22.9	18.2	4.7
1936	27.0	211	21.6	5.4	1.3	.9	.3	.7	.6	.1	27.6	22.0	5.6
1937	28.2	219	22.6	5.6	1.4	1.1	.4	.7	.6	.1	29.0	23.1	5.9
1938	24.4	188	19.7	4.7	1.0	.7	.3	.5	.5	.1	24.8	20.0	4.9
1939	28.4	217	23.1	5.3	1.1	.8	.3	.7	.6	.1	28.8	23.3	5.5
1940	31.0	234	25.4	5.5	1.0	.8	.2	.7	.6	.1	31.2	25.6	5.5
1941	37.2	278	30.5	6.7	.7	.5	.1	1.4	1.2	.2	36.5	29.9	6.7
1942	37.4	276	30.6	6.8	.5	.4	.1	1.5	1.4	.1	36.3	29.5	6.8
1943	34.8	254	27.4	7.4	.3	.2	.1	.9	.7	.1	34.3	26.9	7.4
1944	33.6	242	25.7	7.8	.4	.3	.1	1.0	.8	.1	32.9	25.2	7.8
1945	28.8	205	21.7	7.0	.4	.3	.1	1.1	.9	.2	28.1	21.1	7.0
1946	34.7	244	26.3	8.4	.6	.6	.1	1.2	1.0	.2	34.1	25.9	8.3
1947	35.4	244	27.9	7.5	1.4	1.2	.2	1.3	1.1	.2	35.4	27.9	7.5
1948	38.2	260	30.7	7.5	.6	.6	.1	1.9	1.7	.2	37.0	29.6	7.4
1949	33.1	221	27.4	5.7	.7	.5	.1	1.6	1.4	.1	32.2	26.5	5.7
1950	40.9	269	33.4	7.5	.5	.4	.1	3.4	3.1	.3	38.0	30.6	7.4
1951	38.7	250	30.9	7.8	1.0	.9	.1	2.5	2.3	.3	37.2	29.5	7.7
1952	39.2	249	31.9	7.3	.7	.6	.2	2.5	2.3	.2	37.5	30.2	7.2
1953	38.9	243	31.6	7.3	.6	.5	.1	2.8	2.5	.2	36.7	29.6	7.2
1954	38.7	237	31.5	7.1	.7	.6	.1	3.1	2.9	.2	36.4	29.3	7.1
1955	40.1	242	32.5	7.6	.8	.7	.2	3.6	3.3	.3	37.4	29.8	7.6
1956	40.9	242	32.8	8.1	.8	.6	.2	3.4	3.2	.3	38.2	30.2	8.0
1957	35.0	204	29.2	5.8	.8	.6	.2	3.0	2.7	.2	32.9	27.1	5.8
1958	36.1	206	30.0	6.1	.7	.6	.2	3.4	3.2	.2	33.4	27.4	6.0
1959	40.5	228	33.7	6.8	.8	.6	.2	4.1	3.8	.3	37.2	30.5	6.7
1960	36.0	199	29.6	6.4	.9	.7	.2	3.9	3.6	.3	32.9	26.7	6.3
1961	35.5	193	29.5	6.0	.8	.6	.2	4.3	4.0	.2	32.0	26.1	6.0
1962	37.3	200	30.8	6.5	.8	.6	.1	4.9	4.6	.3	33.2	26.8	6.4
1963	39.2	207	31.8	7.3	.9	.7	.1	5.3	5.0	.3	34.7	27.6	7.2
1964	40.8	213	33.4	7.4	1.0	.8	.1	5.2	4.9	.3	36.6	29.3	7.3
1965	41.1	212	33.4	7.7	.9	.8	.1	5.2	4.9	.3	36.8	29.3	7.5
1966	40.8	207	32.8	8.0	1.0	.9	.2	5.2	4.8	.4	36.6	28.8	7.7
1967	38.8	195	31.1	7.6	1.1	1.0	.2	5.1	4.8	.3	34.7	27.3	7.4
1968	41.5	207	34.0	7.4	1.2	1.0	.1	6.2	5.8	.3	36.5	29.3	7.2
1969	41.0	202	33.2	7.8	1.1	1.0	.1	6.3	5.9	.4	35.8	28.3	7.5
1970 [3]	39.5	192	32.1	7.3	1.3	1.2	.1	6.1	5.8	.3	34.7	27.5	7.1
1971 [3]	43.5	208	36.3	7.1	1.1	.9	.2	7.6	7.2	.4	37.0	30.0	6.9
1972 [3]	47.4	227	40.0	7.4	1.5	1.2	.3	9.4	9.0	.4	39.4	32.2	7.2

[1] Includes small volumes of mixed species (not classified as softwoods or hardwoods).

[2] Less than 50 million board feet.

[3] Preliminary, Forest Service estimates.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Commerce, Bureau of the Census. Production—*Lumber production and mill stocks.* Curr. Ind. Reps. Ser. MA-24T (annual); Exports—*U.S. exports—schedule B commodity and country.* FT 410 (monthly); Imports—*U.S. imports—general and consumption, schedule A commodity and country.* FT 135 (monthly).

TABLE 16.—*Plywood consumption, exports, imports, and domestic production, 1950–72*

[3/8-inch basis]

Year	Domestic consumption				Exports			Imports			Domestic production[1]		
	Total	Per capita	Softwoods	Hardwoods	Total	Softwoods	Hardwoods[2]	Total	Softwoods	Hardwoods	Total	Softwoods	Hardwoods
	Million square feet	*Square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*
1950	---------	---------	2,672	---------	4	3	(3)	45	(3)	45	---------	2,676	---------
1951	4,241	27	2,995	1,245	4	4	1	53	4	49	4,192	2,995	1,197
1952	4,450	28	3,166	1,284	13	13	(3)	60	1	60	4,403	3,178	1,224
1953	5,222	33	3,839	1,383	10	10	1	156	(3)	155	5,076	3,848	1,228
1954	5,405	33	3,983	1,422	7	7	1	306	(3)	306	5,106	3,989	1,116
1955	7,071	43	5,276	1,795	10	8	2	443	(3)	442	6,639	5,284	1,355
1956	7,262	43	5,418	1,844	16	15	1	498	---------	498	6,780	5,432	1,347
1957	7,412	43	5,639	1,773	15	15	1	597	(3)	597	6,830	5,653	1,177
1958	8,267	47	6,475	1,792	14	12	2	643	(3)	643	7,638	6,487	1,151
1959	9,945	56	7,664	2,281	75	72	3	938	---------	938	9,082	7,736	1,346
1960	9,571	53	7,757	1,814	15	13	2	725	11	715	8,861	7,759	1,102
1961	10,523	57	8,495	2,028	17	14	3	739	13	727	9,801	8,496	1,305
1962	11,716	63	9,311	2,404	19	17	2	903	13	891	10,831	9,315	1,516
1963	12,984	69	10,367	2,617	19	18	1	945	10	935	12,058	10,375	1,683
1964	14,380	75	11,431	2,949	31	28	2	1,045	5	1,040	13,366	11,455	1,912
1965	15,492	80	12,402	3,090	37	30	6	1,052	5	1,047	14,477	12,428	2,049
1966	16,126	82	12,804	3,321	56	48	8	1,257	3	1,254	14,925	12,849	2,076
1967	15,909	80	12,758	3,152	93	85	8	1,247	3	1,244	14,756	12,840	1,916
1968	18,213	91	14,332	3,882	78	64	14	1,896	10	1,886	16,395	14,385	2,009
1969	17,314	85	13,354	3,960	215	199	16	2,121	15	2,107	15,407	13,538	1,869
1970[4]	17,822	87	14,038	3,784	172	114	58	2,049	2	2,047	15,945	14,149	1,796
1971[4]	20,722	100	16,262	4,460	114	99	15	2,548	3	2,545	18,288	16,858	1,930
1972[4]	23,455	112	18,089	5,367	247	220	26	3,162	6	3,156	20,540	18,303	2,237

[1] Includes production from both domestic and imported veneer.

[2] Includes mixed species (not classified as hardwoods or softwoods).

[3] Less than 500,000 square feet.

[4] Preliminary, Forest Service estimates.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Commerce, Bureau of the Census. Production—*Softwood plywood.* Curr. Ind. Reps. Ser. MA24H (annual); *Hardwood plywood.* Curr. Ind. Reps. Ser. MA24F (annual); Exports—*U.S. exports—schedule B commodity and country.* FT 410 (monthly); Imports—*U.S. imports—general and consumption, schedule A commodity and country.* FT 135 (monthly).

TABLE 17.—*Apparent consumption, exports, imports, and domestic production of paper and board, 1920–72* [1]

Year	Apparent consumption [2]		Exports	Imports	Domestic production
	Total	Per capita			
	Thousand tons	*Pounds*	*Thousand tons*	*Thousand tons*	*Thousand tons*
1920	7,744	145	219	778	7,185
1921	6,061	112	91	819	5,333
1922	7,878	143	96	1,099	6,875
1923	9,208	164	86	1,423	7,871
1924	9,298	163	91	1,459	7,930
1925	10,437	180	92	1,528	9,002
1926	11,607	198	117	1,930	9,794
1927	11,954	201	113	2,065	10,002
1928	12,489	207	136	2,222	10,403
1929	13,421	220	179	2,485	11,140
1930	12,340	201	160	2,326	10,169
1931	11,400	184	124	2,105	9,382
1932	9,803	157	85	1,827	7,998
1933	10,869	173	98	1,828	9,190
1934	11,201	177	127	2,250	9,187
1935	12,820	201	139	2,438	10,479
1936	14,652	229	137	2,832	11,976
1937	15,653	243	177	3,401	12,837
1938	13,951	215	156	2,336	11,381
1939	15,982	244	198	2,683	13,510
1940	16,770	254	490	2,812	14,484
1941	20,386	306	399	3,056	17,762
1942	19,731	293	264	3,036	17,084
1943	19,644	287	255	2,717	17,036
1944	19,540	282	254	2,574	17,183
1945	19,827	283	396	2,751	17,371
1946	22,550	319	305	3,622	19,278
1947	24,775	344	352	4,116	21,114
1948	26,070	356	295	4,575	21,897
1949	24,781	332	295	4,746	20,315
1950	29,108	382	297	4,998	24,375
1951	30,530	394	528	5,139	26,047
1952	28,971	368	499	5,173	24,418
1953	31,520	394	383	5,215	26,605
1954	31,516	387	591	5,182	26,876
1955	34,979	422	736	5,463	30,178
1956	36,386	431	669	5,844	31,441
1957	35,280	410	751	5,438	30,666
1958	35,248	403	728	5,120	30,823
1959	38,793	436	793	5,579	34,036
1960	39,295	435	897	5,715	34,444
1961	40,461	440	1,042	5,754	35,698
1962	42,345	454	1,001	5,821	37,543
1963	43,913	464	1,149	5,762	39,231
1964	46,518	485	1,496	6,351	41,703
1965	49,244	507	1,640	6,770	44,091
1966	52,640	536	1,813	7,481	47,113
1967	52,075	524	1,966	7,071	46,926
1968	55,798	556	2,467	7,007	51,245
1969	59,004	582	2,603	7,419	54,187
1970 [3]	58,050	567	2,698	7,238	53,516
1971 [3]	59,672	577	2,996	7,584	55,092
1972 [3]	64,322	616	2,999	7,994	59,313

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[1] Data may not add to totals because of rounding.

[2] Includes changes in newsprint stocks beginning in 1929.

[3] Preliminary.

Sources: American Paper Institute. *The statistics of paper.* (annual, 1960 ed. and 1972 sup.), and *Monthly statistical summary.* New York; U.S. Department of Commerce, Bureau of the Census. *Pulp, paper and board.* Cur. Indus. Reps. Ser. M26A. (annual); U.S. Department of Commerce, Bureau of Domestic Commerce. *Pulp, paper and board.* Quart. Indus. Rep.; and U.S. Department of Agriculture, Forest Service.

TABLE 18.—*Apparent consumption, exports, imports, and domestic production of paper, 1920–72* [1]

Year	Apparent consumption [2]		Exports	Imports	Domestic production	Year	Apparent consumption [2]		Exports	Imports	Domestic production
	Total	Per capita					Total	Per capita			
	Thousand tons	*Pounds*	*Thousand tons*	*Thousand tons*	*Thousand tons*		*Thousand tons*	*Pounds*	*Thousand tons*	*Thousand tons*	*Thousand tons*
1920	5, 448	102	158	735	4, 872	1945	11, 004	157	255	2, 700	8, 457
1921	4, 327	80	66	799	3, 594	1946	13, 091	185	217	3, 580	9, 773
1922	5, 717	104	67	1, 066	4, 719	1947	14, 445	200	214	4, 057	10, 705
1923	6, 397	114	52	1, 372	5, 078	1948	15, 350	209	161	4, 500	11, 119
1924	6, 435	113	50	1, 404	5, 080	1949	14, 859	199	181	4, 676	10, 350
1925	7, 131	123	60	1, 476	5, 715	1950	16, 833	221	175	4, 913	12, 064
1926	7, 956	136	63	1, 875	6, 144	1951	17, 630	228	277	5, 025	13, 010
1927	8, 188	138	57	2, 016	6, 228	1952	16, 839	214	326	5, 090	12, 197
1928	8, 455	140	70	2, 184	6, 342	1953	17, 724	221	189	5, 091	12, 739
1929	9, 101	149	93	2, 445	6, 776	1954	17, 873	219	326	5, 073	13, 077
1930	8, 416	137	76	2, 297	6, 191	1955	19, 422	234	414	5, 259	14, 503
1931	7, 671	124	55	2, 085	5, 604	1956	20, 537	243	340	5, 688	15, 419
1932	6, 587	106	41	1, 809	4, 755	1957	19, 757	230	387	5, 308	14, 909
1933	6, 893	110	49	1, 810	5, 182	1958	19, 560	224	346	4, 986	14, 887
1934	7, 219	114	75	2, 229	5, 173	1959	21, 540	242	329	5, 392	16, 506
1935	8, 234	129	77	2, 413	5, 855	1960	22, 055	244	361	5, 574	16, 809
1936	9, 308	145	71	2, 799	6, 598	1961	22, 474	245	405	5, 605	17, 224
1937	9, 969	155	94	3, 363	7, 109	1962	23, 231	249	349	5, 632	17, 966
1938	8, 970	138	71	2, 309	6, 340	1963	23, 976	253	382	5, 537	18, 752
1939	10, 029	153	97	2, 654	7, 484	1964	25, 330	264	432	6, 117	19, 685
1940	10, 606	161	254	2, 791	8, 105	1965	26, 793	276	499	6, 508	20, 761
1941	12, 084	181	264	3, 019	9, 362	1966	28, 719	292	527	7, 238	22, 148
1942	11, 790	175	161	2, 961	9, 115	1967	28, 836	290	517	6, 861	22, 447
1943	11, 043	162	182	2, 663	8, 415	1968	30, 171	301	540	6, 727	23, 971
1944	10, 599	153	180	2, 522	8, 220	1969	31, 794	314	531	7, 127	25, 198
						1970 [3]	31, 692	309	548	7, 027	25, 219
						1971 [3]	32, 404	313	563	7, 306	25, 669
						1972 [3]	34, 076	326	574	7, 577	27, 087

[1] Data may not add to totals because of rounding.

[2] Includes changes in newsprint stocks beginning in 1929.

[3] Preliminary.

Sources: See source note table 17, Append. V.

TABLE 19.—*Apparent consumption, exports, imports, and domestic production of paperboard,*[1] *1920–72* [2]

Year	Apparent consumption		Exports	Imports	Domestic production
	Total	Per capita			
	Thousand tons	*Pounds*	*Thousand tons*	*Thousand tons*	*Thousand tons*
1920	2,296	43	61	43	2,313
1921	1,734	32	26	20	1,740
1922	2,162	39	28	34	2,156
1923	2,811	50	34	52	2,793
1924	2,863	50	41	54	2,850
1925	3,224	56	27	15	3,236
1926	3,549	60	51	20	3,580
1927	3,685	62	36	18	3,702
1928	3,953	66	39	11	3,981
1929	4,183	69	50	11	4,222
1930	3,816	62	47	8	3,855
1931	3,622	58	47	3	3,666
1932	3,151	50	31	1	3,181
1933	3,930	63	32	12	3,950
1934	3,923	62	34	11	3,946
1935	4,521	71	39	16	4,544
1936	5,257	82	39	16	5,280
1937	5,586	87	52	19	5,618
1938	4,873	75	61	12	4,922
1939	5,850	89	73	12	5,911
1940	6,001	91	209	10	6,200
1941	7,679	115	106	13	7,771
1942	7,059	104	84	50	7,093
1943	7,695	112	63	24	7,734
1944	8,006	115	61	21	8,045
1945	7,933	113	96	22	8,008
1946	8,481	120	61	14	8,529
1947	9,265	128	97	26	9,337
1948	9,455	128	98	45	9,508
1949	9,085	121	89	48	9,127
1950	11,046	145	99	55	11,090
1951	11,626	150	226	81	11,771
1952	10,820	137	149	57	10,912
1953	12,417	155	172	98	12,491
1954	12,149	149	241	64	12,327
1955	13,891	167	296	141	14,045
1956	14,151	168	300	71	14,381
1957	13,914	162	338	52	14,200
1958	13,963	160	362	54	14,271
1959	15,236	171	443	55	15,624
1960	15,371	170	515	35	15,851
1961	16,054	175	615	39	16,629
1962	17,048	183	630	46	17,632
1963	17,682	187	740	42	18,380
1964	18,739	195	1,034	20	19,753
1965	19,885	205	1,112	18	20,979
1966	21,526	219	1,252	56	22,722
1967	20,833	210	1,418	22	22,229
1968	22,795	227	1,892	28	24,659
1969	24,210	239	2,026	20	26,217
1970 [3]	23,530	230	2,105	19	25,616
1971 [3]	23,900	231	2,381	23	26,258
1972 [3]	26,410	253	2,364	13	28,761

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[1] Includes wet machine board. Also includes small quantities of building board for the years 1920–24.

[2] Data may not add to totals because of rounding.

[3] Preliminary.

Sources: See note table 17, Append. V.

TABLE 20.—*Apparent consumption, exports, imports, and domestic production of building board, 1920–72* [1]

Year	Apparent consumption						Exports			Imports			Domestic production		
	Total			Per capita											
	Total	Insulating board	Hardboard	Total	Insulating board	Hardboard	Total	Insulating board	Hardboard	Total	Insulating board	Hardboard	Total	Insulating board	Hardboard
	Thousand tons	*Thousand tons*	*Thousand tons*	*Pounds*	*Pounds*	*Pounds*	*Thousand tons*	*Thousand tons*	*Thousand tons*	*Thousand tons*	*Thousand tons*	*Thousand tons*	*Thousand tons*	*Thousand tons*	*Thousand tons*
1925	83	---	---	1	---	---	5	---	---	36	---	---	51	---	---
1926	102	---	---	2	---	---	4	---	---	35	---	---	70	---	---
1927	81	---	---	1	---	---	20	---	---	30	---	---	71	---	---
1928	80	---	---	1	---	---	27	---	---	26	---	---	81	---	---
1929	137	---	---	2	---	---	35	---	---	29	---	---	143	---	---
1930	108	---	---	2	---	---	37	---	---	21	---	---	124	---	---
1931	107	---	---	2	---	---	22	---	---	17	---	---	112	---	---
1932	65	---	---	1	---	---	13	---	---	16	---	---	62	---	---
1933	47	---	---	1	---	---	18	---	---	6	---	---	58	---	---
1934	59	---	---	1	---	---	18	---	---	9	---	---	68	---	---
1935	65	---	---	1	---	---	23	---	---	8	---	---	80	---	---
1936	88	---	---	1	---	---	27	---	---	17	---	---	98	---	---
1937	98	---	---	2	---	---	31	27	4	19	---	---	110	---	---
1938	109	---	---	2	---	---	24	---	---	15	---	---	118	---	---
1939	102	---	---	2	---	---	28	20	8	16	4	12	115	---	---
1940	163	---	---	2	---	---	27	---	---	10	---	---	179	---	---
1941	623	---	---	9	---	---	29	15	15	24	3	21	629	---	---
1942	882	---	---	13	---	---	19	---	---	25	---	---	877	---	---
1943	907	---	---	13	---	---	10	7	3	30	2	28	887	---	---
1944	936	---	---	14	---	---	13	---	---	30	---	---	918	637	281
1945	890	621	269	13	9	4	45	26	19	29	1	28	906	646	260
1946	977	---	---	14	---	---	27	---	---	28	---	---	976	---	---
1947	1,064	744	320	15	10	4	41	28	13	33	1	32	1,072	771	302
1948	1,266	888	377	17	12	5	36	18	18	31	(2)	30	1,270	906	365
1949	837	604	233	11	8	3	25	19	6	22	(2)	22	839	622	217
1950	1,228	826	402	16	11	5	23	16	8	31	3	27	1,221	838	383
1951	1,274	901	373	16	12	5	25	20	5	33	3	30	1,266	918	348
1952	1,311	886	425	17	11	5	25	17	8	27	4	23	1,309	899	410
1953	1,379	939	440	17	12	5	21	17	4	26	5	20	1,374	951	423
1954	1,495	993	502	18	12	6	23	18	5	45	4	42	1,473	1,008	465
1955	1,668	1,089	579	20	13	7	26	20	6	64	9	55	1,630	1,100	530
1956	1,699	1,091	609	20	13	7	29	22	7	86	11	76	1,642	1,102	540
1957	1,610	975	634	19	11	7	26	20	7	78	6	72	1,558	989	569
1958	1,725	1,052	673	20	12	8	20	14	6	79	9	70	1,666	1,057	609
1959	2,018	1,172	845	23	13	10	20	14	6	133	15	117	1,905	1,171	734
1960	1,869	1,096	774	21	12	9	20	14	6	106	12	94	1,784	1,098	686
1961	1,933	1,077	856	21	12	9	22	16	6	110	9	100	1,845	1,084	762
1962	2,066	1,079	987	22	12	11	22	16	6	143	15	128	1,945	1,080	865
1963	2,255	1,142	1,113	24	12	12	27	19	8	183	22	161	2,098	1,139	959
1964	2,448	1,218	1,230	26	13	13	30	19	11	214	23	190	2,265	1,215	1,050
1965	2,566	1,265	1,301	26	13	13	29	16	13	244	23	221	2,351	1,258	1,093
1966	2,395	1,161	1,236	24	12	13	35	18	16	187	24	163	2,243	1,155	1,089
1967	2,407	1,185	1,222	24	12	12	32	16	15	188	25	163	2,250	1,176	1,074
1968	2,831	1,352	1,480	28	13	15	36	17	18	252	36	217	2,615	1,333	1,282
1969	3,000	1,362	1,638	30	13	16	46	24	21	272	34	238	2,773	1,352	1,421
1970 [3]	2,829	1,235	1,594	28	12	16	45	19	26	192	35	156	2,682	1,219	1,463
1971 [3]	3,367	1,457	1,910	33	14	18	52	25	28	255	35	219	3,164	1,446	1,718
1972 [3]	3,809	1,558	2,251	36	15	22	60	26	34	404	35	369	3,464	1,548	1,916

[1] Data may not add to totals because of rounding.

[2] Less than 500 tons.

[3] Preliminary.

Sources: See source note table 17, Append. V.

TABLE 21.—*Paper and board exports from the United States, by grade and major region of destination, 1971* [1]

[Thousand tons]

Region	Total paper and board	Paper						Board		
		Total	Newsprint	Book paper	Fine paper	Coarse and industrial paper	Other paper	Total	Building board	Other board
Canada	307	121	2	26	36	48	10	186	33	153
Latin America	701	167	73	29	13	41	11	533	3	530
Western Europe	1,323	90	7	31	21	28	2	1,233	11	1,222
Eastern Europe	24	(2)	--------	--------	(2)	(2)	(2)	24	(2)	24
Africa	153	25	(2)	3	3	18	1	128	2	126
Near and Middle East	117	11	--------	1	1	9	(2)	106	1	106
Far East	303	127	81	4	24	17	1	176	1	175
Oceania	60	16	2	3	4	5	2	44	(2)	44
Other countries	8	5	(2)	1	1	2	1	3	1	2
Total	2,996	563	166	97	102	169	29	2,434	52	2,381

[1] Data may not add to totals because of rounding.
[2] Less than 500 tons.

Source: U.S. Department of Commerce, Bureau of the Census. *U.S. exports.* FT 410. 1971 (annual).

TABLE 22.—*Paper and board imports into the United States, by grade and major region of origin, 1971* [1]

[Thousand tons]

Region	Total paper and board	Paper						Board		
		Total	Newsprint	Book paper	Fine paper	Coarse and industrial paper	Other paper	Total	Building board	Other board
Canada	7,001	6,910	6,564	246	1	61	38	91	75	16
Latin America	41	(2)	--------	(2)	--------	(2)	(2)	41	41	(2)
Western Europe	508	394	317	42	9	25	1	115	108	7
Eastern Europe	(2)	--------	--------	--------	--------	--------	--------	(2)	(2)	--------
Africa	20	--------	--------	--------	--------	--------	--------	20	20	--------
Near and Middle East	6	--------	--------	--------	--------	--------	--------	6	6	--------
Far East	3	2	--------	2	(2)	(2)	(2)	(2)	(2)	(2)
Oceania	5	(2)	--------	(2)	(2)	(2)	--------	5	5	(2)
Other countries	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
Total	7,584	7,306	6,881	291	10	86	39	278	255	23

[1] Data may not add to totals because of rounding.
[2] Less than 500 tons.

Source: U.S. Department of Commerce, Bureau of the Census. *U.S. imports.* FT 135. 1971 (annual).

TABLE 23.—*Fibrous materials consumed in the manufacture of paper and board, by type of material, specified years 1919–72* [1]

Year	Consumption of fibrous materials				Consumption of fibrous materials per ton of paper and board produced			
	Total	Wood-pulp	Waste-paper	Other	Total	Wood-pulp	Waste-paper	Other
	Thousand tons	*Thousand tons*	*Thousand tons*	*Thousand tons*	*Tons*	*Tons*	*Tons*	*Tons*
1919	6,622	4,020	1,854	748	1.110	0.674	0.311	0.125
1929	11,575	6,289	3,842	1,443	1.039	.565	.345	.129
1935	10,999	6,442	3,587	969	1.050	.615	.342	.092
1939	14,177	8,650	4,366	1,161	1.049	.640	.323	.086
1940	15,493	9,782	4,668	1,044	1.070	.675	.322	.072
1941	18,856	11,364	6,075	1,418	1.062	.640	.342	.080
1942	17,858	11,038	5,495	1,325	1.045	.646	.322	.078
1943	18,199	10,635	6,368	1,196	1.068	.624	.374	.070
1944	18,747	10,502	6,859	1,385	1.091	.611	.399	.081
1945	18,969	10,825	6,800	1,344	1.092	.623	.391	.077
1946	20,752	12,092	7,278	1,382	1.077	.627	.378	.072
1947	22,788	13,253	8,009	1,526	1.079	.628	.379	.072
1948	23,411	14,375	7,585	1,452	1.069	.657	.346	.066
1949	21,451	13,636	6,600	1,215	1.056	.671	.325	.060
1950	25,904	16,509	7,956	1,439	1.062	.677	.326	.059
1951	28,265	17,737	9,071	1,457	1.085	.681	.348	.056
1952	26,378	17,286	7,881	1,211	1.080	.708	.323	.050
1953	28,469	18,684	8,531	1,255	1.072	.703	.321	.047
1954	28,045	18,989	7,857	1,200	1.044	.707	.292	.045
1955	31,835	21,454	9,041	1,340	1.056	.711	.300	.045
1956	33,386	22,998	8,836	1,551	1.052	.730	.282	.040
1957	32,058	22,459	8,493	1,105	1.045	.732	.277	.036
1958	32,157	22,483	8,671	1,003	1.043	.729	.281	.033
1959	35,549	25,155	9,414	979	1.045	.740	.277	.028
1960	35,703	25,700	9,032	971	1.036	.746	.262	.028
1961	36,595	26,683	9,018	894	1.025	.747	.253	.025
1962	38,636	28,598	9,075	963	1.029	.762	.242	.025
1963	41,117	30,220	9,613	1,285	1.048	.770	.245	.033
1964	42,860	32,088	9,843	929	1.019	.768	.228	.023
1965	45,116	34,006	10,231	879	1.024	.772	.232	.020
1966	48,466	36,922	10,564	980	1.029	.784	.224	.021
1967	47,718	36,994	9,888	836	1.017	.788	.211	.018
1968	52,429	41,303	10,222	905	1.023	.806	.199	.018
1969	55,517	43,700	10,939	878	1.024	.806	.202	.016
1970 [2]	54,614	43,192	10,594	828	1.021	.807	.198	.015
1971 [2]	56,041	44,183	10,997	861	1.017	.802	.200	.016
1972 [2]	58,801	46,622	11,269	910	.991	.786	.190	.015

[1] Data may not add to totals because of rounding.

[2] Preliminary.

Sources: American Paper Institute. *Wood pulp statistics.* New York, 1972 (annual); U.S. Department of Commerce, Bureau of the Census. *Pulp, paper and board.* Cur. Indus. Reps. Ser. M26A (annual); and U.S. Department of Agriculture, Forest Service.

TABLE 24.—*Apparent consumption, exports, imports, and domestic production of woodpulp, 1920–72* [1]

Year	Apparent consumption		Exports	Imports	Domestic production
	Total	Per capita			
	Thousand tons	*Pounds*	*Thousand tons*	*Thousand tons*	*Thousand tons*
1920	4,696	88	32	906	3,822
1921	3,544	65	28	697	2,876
1922	4,756	86	25	1,259	3,522
1923	5,149	92	23	1,383	3,789
1924	5,214	91	32	1,523	3,723
1925	5,588	97	38	1,664	3,962
1926	6,092	104	34	1,731	4,395
1927	5,957	100	32	1,676	4,313
1928	6,232	103	33	1,755	4,511
1929	6,690	110	54	1,881	4,863
1930	6,412	104	48	1,830	4,630
1931	5,952	96	53	1,596	4,409
1932	5,194	83	48	1,482	3,760
1933	6,139	98	79	1,942	4,276
1934	6,099	97	143	1,806	4,436
1935	6,687	105	172	1,933	4,926
1936	7,779	121	193	2,278	5,695
1937	8,645	134	323	2,395	6,573
1938	7,503	116	140	1,710	5,934
1939	8,880	136	140	2,026	6,993
1940	9,703	147	481	1,225	8,960
1941	11,205	168	329	1,158	10,375
1942	11,642	173	378	1,237	10,783
1943	10,685	156	301	1,306	9,680
1944	10,962	158	218	1,072	10,108
1945	11,786	168	135	1,754	10,167
1946	12,373	175	39	1,805	10,607
1947	14,138	196	130	2,322	11,946
1948	14,955	204	94	2,176	12,872
1949	13,848	186	122	1,763	12,207
1950	17,138	225	96	2,385	14,849
1951	18,683	241	202	2,361	16,524
1952	18,198	231	212	1,937	16,473
1953	19,533	244	162	2,158	17,537
1954	19,865	244	442	2,051	18,256
1955	22,323	269	631	2,214	20,740
1956	23,938	283	525	2,332	22,131
1957	23,278	271	622	2,101	21,800
1958	23,385	267	515	2,105	21,796
1959	26,162	294	653	2,431	24,383
1960	26,563	294	1,142	2,389	25,316
1961	27,812	303	1,178	2,467	26,523
1962	29,511	316	1,186	2,789	27,908
1963	31,474	332	1,422	2,775	30,121
1964	33,777	352	1,580	2,942	32,415
1965	35,721	368	1,402	3,130	33,993
1966	38,388	391	1,572	3,357	36,603
1967	38,126	384	1,721	3,170	36,677
1968	42,522	424	1,902	3,532	40,892
1969	44,751	442	2,103	4,040	42,813
1970 [2]	44,085	426	3,095	3,518	43,662
1971 [2]	45,273	437	2,175	3,515	43,933
1972 [2]	47,817	458	2,253	3,728	46,342

[1] Data may not add to totals because of rounding.

[2] Preliminary.

Note: Total woodpulp production data prior to 1940 contains woodpulp not shown separately by type.

Sources: American Paper Institute. *Wood pulp statistics*. New York, 1972 (annual); U.S. Department of Commerce, Bureau of the Census. *Pulp, paper and board*. Cur. Indus. Reps. Ser. M26A. (annual); U.S. Department of Commerce. *Pulp, paper and board*, Quart. Indus. Rep.; and U.S. Department of Agriculture, Forest Service.

TABLE 25.—*Woodpulp exports from the United States, by type and major region of destination, 1971* [1]

[Thousand tons]

Region	Total	Dissolving and special alpha	Sulfite	Sulfate	All other
Canada	72	17	6	49	1
Latin America	277	106	27	144	1
Western Europe	1, 079	345	74	659	1
Eastern Europe	82	70	(2)	12	----------
Africa	46	(2)	2	45	----------
Near and Middle East	24	5	5	14	----------
Far East	533	241	79	206	7
Oceania	60	6	20	35	----------
Other	1	(2)	(2)	(2)	(2)
Total	2, 175	790	213	1, 164	9

[1] Data may not add to totals because of rounding.
[2] Less than 500 tons.

Source: U.S. Department of Commerce, Bureau of the Census. *U.S. Exports.* FT 410. 1971 (annual).

TABLE 26.—*Woodpulp imports into the United States, by type and major region of origin, 1971* [1]

[Thousand tons]

Region	Total	Dissolving and special alpha	Sulfite	Sulfate	Soda	Groundwood	All other
Canada	3,385	250	401	2,533	(2)	179	22
Latin America	3	----------	2	1	----------	----------	----------
Western Europe	62	1	5	50	----------	(2)	4
Eastern Europe	----------	----------	----------	----------	----------	----------	----------
Africa	65	64	----------	----------	----------	(2)	1
Near and Middle East	----------	----------	----------	----------	----------	----------	----------
Far East	----------	----------	----------	----------	----------	----------	----------
Oceania	----------	----------	----------	----------	----------	----------	----------
Total	3,515	315	408	2,584	(2)	179	28

[1] Data may not add to totals because of rounding.
[2] Less than 500 tons.

Source: U.S. Department of Commerce, Bureau of the Census. *U.S. Imports.* FT 135. 1971 (annual).

TABLE 27.—*Apparent consumption, exports, imports, and domestic production of pulpwood, 1920–72*

[Million cords]

Year	Total domestic consumption and exports	Apparent consumption		Exports				Imports				Domestic production of pulpwood				
		Total[1]	In U.S. mills	Total	Pulpwood	Wood-pulp[2]	Paper and board[2]	Total	Pulpwood	Wood-pulp[2]	Paper and board[2]	Total	Roundwood			Plant by-products[2]
													Total	Softwood	Hardwood	
1920	8.6	8.2	6.1	0.5	-----	-----	0.5	3.8	1.2	1.6	1.0	4.9	4.7	4.2	0.5	0.2
1921	6.9	6.7	4.6	.2	-----	-----	.2	3.4	1.1	1.2	1.1	3.5	3.4	3.1	.3	.1
1922	9.3	9.0	5.6	.3	-----	-----	.2	4.8	1.0	2.3	1.4	4.5	4.5	4.0	.5	.1
1923	10.2	10.0	5.9	.2	-----	-----	.2	5.7	1.3	2.4	1.9	4.5	4.4	3.9	.5	.1
1924	10.4	10.1	5.8	.3	-----	0.1	.2	5.9	1.3	2.8	1.9	4.5	4.4	3.9	.5	.1
1925	11.0	10.7	6.1	.3	-----	.1	.2	6.4	1.5	3.0	2.0	4.6	4.5	4.0	.5	.2
1926	12.4	12.1	6.8	.3	-----	.1	.2	7.0	1.4	3.1	2.5	5.4	5.2	4.7	.5	.2
1927	12.6	12.1	6.8	.4	0.1	.1	.2	7.3	1.6	3.1	2.7	5.2	4.9	4.4	.6	.3
1928	13.3	12.8	7.2	.4	-----	.1	.3	7.6	1.5	3.2	2.9	5.6	5.2	4.6	.6	.5
1929	14.4	13.8	7.6	.5	.1	.1	.3	8.0	1.4	3.4	3.2	6.3	5.8	5.1	.7	.6
1930	13.6	13.1	7.2	.5	.1	.1	.3	7.9	1.6	3.3	3.0	5.7	5.2	4.5	.7	.6
1931	12.4	12.1	6.7	.4	.1	.1	.2	6.7	1.0	2.9	2.7	5.8	5.2	4.7	.5	.6
1932	10.7	10.4	5.6	.3	-----	.1	.1	5.7	.6	2.7	2.4	5.0	4.6	4.1	.4	.4
1933	12.6	12.3	6.6	.3	-----	.2	.1	6.7	.7	3.6	2.4	5.9	5.4	4.7	.7	.5
1934	13.0	12.5	6.8	.5	-----	.3	.2	7.2	1.0	3.4	2.9	5.8	5.6	4.9	.7	.2
1935	14.4	13.8	7.6	.6	-----	.3	.2	7.8	1.0	3.6	3.1	6.6	6.3	5.6	.8	.3
1936	16.6	16.0	8.7	.6	-----	.4	.2	9.1	1.2	4.2	3.6	7.5	7.2	6.2	1.0	.3
1937	19.2	18.3	10.4	.9	-----	.7	.3	10.3	1.5	4.5	4.3	8.9	8.4	7.4	1.0	.5
1938	15.5	14.9	9.2	.6	.1	.3	.2	7.5	1.3	3.2	3.0	8.0	7.8	7.0	.8	.2
1939	18.0	17.4	10.8	.6	.1	.3	.3	8.3	1.1	3.7	3.4	9.7	9.5	8.5	.9	.3
1940	19.7	18.1	13.7	1.6	.1	.9	.6	7.3	1.4	2.2	3.6	12.4	12.1	10.8	1.3	.2
1941	21.9	20.6	15.7	1.3	.1	.6	.6	7.7	1.6	2.1	4.0	14.2	14.0	12.4	1.5	.2
1942	22.7	21.5	16.6	1.2	.1	.7	.4	7.8	1.7	2.3	3.8	14.9	14.8	13.0	1.7	.2
1943	20.8	19.8	14.9	1.0	-----	.6	.4	7.2	1.4	2.4	3.4	13.6	13.5	11.8	1.6	.1
1944	22.0	21.2	16.7	.8	-----	.4	.4	6.6	1.4	2.0	3.2	15.4	15.2	13.2	2.0	.2
1945	23.6	22.7	16.8	.9	-----	.3	.6	8.3	1.6	3.2	3.5	15.3	14.9	12.8	2.1	.4
1946	26.6	26.0	18.6	.6	.1	.1	.5	9.6	1.7	3.3	4.6	17.0	16.4	14.0	2.4	.6
1947	29.8	28.9	20.3	.9	.1	.3	.6	11.3	1.8	4.2	5.2	18.5	17.7	15.3	2.4	.8
1948	31.8	31.1	22.0	.7	-----	.2	.5	11.8	2.0	4.0	5.8	20.0	19.1	16.7	2.4	1.0
1949	28.2	27.5	19.0	.7	-----	.2	.5	10.6	1.4	3.2	6.0	17.6	16.5	14.3	2.2	1.1
1950	32.7	32.0	22.1	.7	-----	.2	.4	12.0	1.4	4.3	6.3	20.7	19.5	16.7	2.8	1.2
1951	38.3	37.1	27.6	1.2	-----	.4	.8	13.2	2.5	4.2	6.5	25.1	23.7	20.1	3.6	1.4
1952	37.1	36.0	27.2	1.1	-----	.4	.7	12.1	2.1	3.5	6.5	25.0	23.5	20.0	3.5	1.6
1953	38.3	37.4	27.9	.9	-----	.3	.6	12.0	1.6	3.9	6.6	26.3	24.8	20.7	4.1	1.5
1954	38.8	37.1	28.5	1.7	-----	.9	.8	11.8	1.6	3.7	6.5	27.0	25.5	20.9	4.5	1.5
1955	43.6	41.3	32.7	2.3	.1	1.2	1.0	12.6	1.8	3.9	6.8	31.0	28.6	23.4	5.2	2.4
1956	48.6	46.5	37.0	2.1	.1	1.0	.9	13.4	1.9	4.1	7.4	35.2	32.1	26.2	5.9	3.0
1957	46.7	44.3	36.1	2.4	.1	1.2	1.1	12.3	1.8	3.7	6.9	34.4	30.5	24.5	6.0	3.9
1958	44.7	42.6	34.5	2.1	.1	1.0	1.0	11.5	1.4	3.7	6.5	33.2	28.1	22.4	5.6	5.2
1959	49.2	46.7	37.8	2.5	.1	1.3	1.1	12.5	1.2	4.3	7.0	36.7	30.6	23.4	7.2	6.1
1960	52.7	49.1	41.2	3.6	.2	2.2	1.2	12.7	1.3	4.2	7.2	40.0	33.5	25.4	8.0	6.5
1961	53.2	49.4	41.4	3.8	.2	2.2	1.4	12.9	1.3	4.3	7.3	40.3	32.1	24.0	8.1	8.2
1962	56.4	52.6	44.1	3.8	.1	2.3	1.4	13.6	1.4	4.8	7.3	42.8	33.3	24.3	9.0	9.4
1963	58.4	54.0	46.3	4.4	.1	2.7	1.6	13.7	1.6	4.8	7.3	44.7	34.7	25.1	9.5	10.0
1964	63.0	57.9	50.0	5.1	.1	3.0	2.1	14.4	1.5	5.0	8.0	48.6	37.4	26.9	10.5	11.2
1965	67.4	62.4	53.5	5.0	.2	2.7	2.2	15.1	1.3	5.3	8.5	52.3	40.3	29.2	11.0	12.0
1966	72.6	67.0	57.2	5.6	.3	2.9	2.4	16.5	1.4	5.7	9.4	56.1	41.8	29.6	12.2	14.2
1967	73.4	66.9	58.4	6.5	.6	3.4	2.6	15.9	1.6	5.4	8.9	57.5	41.8	30.1	11.7	15.7
1968	77.9	70.0	61.9	7.9	1.2	3.5	3.2	16.2	1.4	5.9	8.8	61.7	44.2	32.1	12.1	17.4
1969	84.1	75.1	66.2	9.0	1.7	3.9	3.4	17.2	1.0	6.8	9.3	66.9	47.1	33.6	13.5	19.8
1970[3]	86.8	75.9	69.8	10.9	1.8	5.7	3.4	16.3	1.1	6.0	9.2	70.5	50.2	36.7	13.6	20.2
1971[3]	85.5	75.9	68.0	9.6	1.5	3.4	4.7	17.1	1.2	5.4	10.5	68.3	46.7	33.4	13.3	21.6
1972[3]	88.8	79.3	72.4	9.5	2.0	3.5	4.0	15.4	1.0	5.7	8.7	73.4	48.1	34.2	14.0	25.3

[1] Includes consumption of pulpwood in U.S. mills and the pulpwood equivalent of the net imports of paper, board, and woodpulp.

[2] Roundwood equivalent.

[3] Preliminary, Forest Service estimates.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Commerce, Bureau of the Census, *Pulp, paper, and board*. Curr. Ind. Reps. Ser. M26A (annual); *U.S. imports—general and consumption, schedule A commodity and country*. FT 135 (annual); *U.S. exports—schedule B commodity and country*. FT 410 (annual). American Paper Institute. *Monthly statistical summary*. New York. U.S. Department of Agriculture, Forest Service.

TABLE 28.—*Consumption of pulpwood in the manufacture of woodpulp, 1920–72*

Year	Total		
	Pulpwood consumption		Woodpulp production
	Total	Per ton of pulp produced	
	Thousand cords	*Cords*	*Thousand tons*
1920	6, 114	1. 60	3, 822
1921	4, 557	1. 58	2, 876
1922	5, 549	1. 58	3, 522
1923	5, 873	1. 55	3, 789
1924	5, 768	1. 55	3, 723
1925	6, 094	1. 54	3, 962
1926	6, 766	1. 54	4, 395
1927	6, 751	1. 57	4, 313
1928	7, 160	1. 59	4, 511
1929	7, 645	1. 57	4, 863
1930	7, 195	1. 55	4, 630
1931	6, 723	1. 52	4, 409
1932	5, 633	1. 50	3, 760
1933	6, 582	1. 54	4, 276
1934	6, 797	1. 53	4, 436
1935	7, 628	1. 55	4, 926
1936	8, 716	1. 53	5, 695
1937	10, 394	1. 58	6, 573
1938	9, 194	1. 55	5, 934
1939	10, 816	1. 55	6, 993
1940	13, 743	1. 53	8, 960
1941	15, 736	1. 52	10, 375
1942	16, 567	1. 54	10, 783
1943	14, 935	1. 54	9, 680
1944	16, 700	1. 65	10, 108
1945	16, 776	1. 65	10, 167
1946	18, 641	1. 76	10, 607
1947	20, 293	1. 70	11, 946
1948	22, 009	1. 71	12, 872
1949	19, 029	1. 56	12, 207
1950	22, 101	1. 49	14, 849
1951	27, 625	1. 67	16, 524
1952	27, 153	1. 65	16, 473
1953	27, 863	1. 59	17, 537
1954	28, 534	1. 56	18, 256
1955	32, 652	1. 57	20, 740
1956	36, 958	1. 67	22, 131
1957	36, 087	1. 66	21, 800
1958	34, 509	1. 58	21, 796
1959	37, 772	1. 55	24, 383
1960	41, 170	1. 63	25,316
1961	41, 434	1. 56	26,523
1962	44, 064	1. 58	27,908
1963	46, 251	1. 54	30,121
1964	49, 991	1. 54	32,415
1965	53, 468	1. 57	33, 993
1966	57, 174	1. 56	36, 603
1967	58, 419	1. 59	36, 677
1968	61, 903	1. 51	40, 892
1969	66, 225	1. 55	42, 813
1970 [1]	69, 760	1. 60	43, 662
1971 [1]	68, 040	1. 55	43, 933
1972 [1]	72, 425	1. 56	46, 342

[1] Preliminary.

Sources: American Paper Institute, Inc. *Wood pulp statistics.* 1972 (annual); U.S. Department of Commerce, Bureau of the Census. *Pulp, paper and board.* Cur. Indus. Reps. Ser. M26A.

TABLE 29.—*Production, imports, exports, and apparent domestic consumption of forest products, by major products, 1940–72* [1]

[Million tons, air dry weight]

Year	All products		Products from industrial roundwood							
			Total				Lumber			
	Domestic production	Apparent consumption	Domestic production	Imports	Exports	Apparent consumption	Domestic production	Imports	Exports	Apparent consumption
1940	139.1	140.9	63.6	3.9	2.1	65.4	34.4	0.8	1.0	34.2
1941	142.1	145.2	72.4	4.6	1.3	75.5	40.9	1.5	.7	41.7
1942	127.5	131.1	71.9	4.8	1.2	75.5	40.5	1.6	.4	41.7
1943	121.5	124.4	67.5	3.9	1.1	70.4	38.9	.9	.3	39.5
1944	123.3	126.0	66.7	3.7	1.0	69.4	38.0	1.1	.4	38.7
1945	117.9	121.4	60.2	4.6	1.1	63.7	32.7	1.2	.5	33.4
1946	120.2	124.5	68.3	5.5	1.1	72.6	39.4	1.4	.7	40.1
1947	123.9	128.2	71.8	6.4	2.0	76.1	40.1	1.4	1.3	40.2
1948	124.4	130.5	72.7	7.2	1.2	78.8	41.6	2.0	.6	43.0
1949	118.9	124.2	64.2	6.6	1.3	69.5	35.7	1.7	.8	36.6
1950	118.4	126.7	74.3	9.5	1.1	82.6	42.6	3.6	.6	45.6
1951	118.3	124.9	75.0	8.6	1.9	81.6	42.0	2.7	1.1	43.6
1952	113.2	119.9	74.3	8.3	1.6	81.0	42.0	2.6	.8	43.8
1953	112.0	119.4	74.7	8.9	1.5	82.1	41.3	2.9	.7	43.5
1954	110.2	117.3	74.5	9.2	2.1	81.6	40.7	3.2	.8	43.1
1955	111.9	119.6	78.0	10.2	2.6	85.7	41.3	3.8	.9	44.2
1956	112.6	120.7	80.4	10.6	2.6	88.5	42.6	3.6	.9	45.3
1957	103.2	110.2	72.7	9.7	2.6	79.7	35.8	3.1	.9	38.0
1958	102.7	110.0	73.9	9.9	2.6	81.2	36.6	3.5	.8	39.3
1959	103.0	116.7	80.9	11.6	2.9	89.6	40.7	4.3	.9	44.1
1960	102.0	109.6	76.6	11.4	3.8	84.2	35.9	4.1	.9	39.1
1961	101.2	108.6	77.5	11.8	4.4	84.9	34.8	4.4	.9	38.3
1962	102.7	111.3	80.7	13.1	4.5	89.3	36.2	5.1	.8	40.5
1963	108.1	115.6	87.5	13.5	6.0	95.0	38.1	5.5	.9	42.7
1964	112.8	120.1	93.6	14.2	6.9	100.9	40.1	5.4	1.0	44.5
1965	114.9	122.4	97.0	14.7	7.3	104.5	40.5	5.5	1.0	45.0
1966	117.3	124.7	100.8	15.8	8.4	108.2	40.5	5.5	1.1	44.9
1967	114.6	118.9	99.4	15.1	10.9	103.7	38.4	5.4	1.2	42.6
1968	121.1	124.3	107.4	17.1	13.9	110.6	39.8	6.4	1.2	45.0
1969	120.0	123.8	107.9	18.3	14.4	111.7	39.5	6.6	1.2	44.9
1970 [2]	118.6	119.1	108.1	17.4	16.9	108.6	37.8	6.3	1.3	43.0
1971 [2]	121.6	126.8	111.8	19.5	14.3	117.0	39.4	7.8	1.2	46.7
1972 [2]	130.9	134.2	121.6	21.4	18.1	124.9	42.5	9.7	1.6	50.6

See footnotes at end of table.

TABLE 29.—*Production, imports, exports, and apparent domestic consumption of forest products, by major products, 1940–72* [1]—Continued

[Million tons, air dry weight]

Years	Products from industrial roundwood—Continued														Fuelwood—apparent consumption
	Plywood and veneer				Panel products [3]				Woodpulp [4]				Miscellaneous products [8]—apparent consumption	Log exports	
	Domestic production [5]	Imports	Exports	Apparent consumption [5]	Domestic production	Imports	Exports	Apparent consumption	Domestic production	Imports [6]	Exports [7]	Apparent consumption			
1940	1.8	(*)	(*)	1.8	0.2	(*)	(*)	0.2	8.8	3.1	0.9	11.0	18.2	0.2	75.5
1941	1.7	(*)	(*)	1.7	.6	(*)	(*)	.6	9.7	3.1	.7	12.1	19.4	.1	69.7
1942	1.7	(*)	0.1	1.6	.9	(*)	(*)	.9	9.9	3.2	.6	12.5	18.8	.1	55.6
1943	1.5	(*)	.1	1.4	.9	(*)	(*)	.9	8.8	3.0	.5	11.3	17.3	.1	54.0
1944	1.5	(*)	.1	1.4	.9	(*)	(*)	.9	9.2	2.6	.4	11.4	17.0	.1	56.6
1945	1.3	(*)	.1	1.2	.9	(*)	(*)	.9	9.3	3.4	.4	12.3	15.9	.1	57.7
1946	1.5	(*)	.1	1.4	1.0	(*)	(*)	1.0	9.6	4.0	.3	13.3	16.8	(*)	51.9
1947	1.8	(*)	.1	1.7	1.1	(*)	(*)	1.1	10.9	4.9	.4	15.4	17.7	.2	52.1
1948	1.9	(*)	(*)	1.9	1.3	(*)	(*)	1.3	11.7	5.2	.3	16.6	16.0	.2	51.7
1949	2.0	(*)	(*)	2.0	.9	(*)	(*)	.9	11.4	4.9	.3	16.0	14.0	.2	54.7
1950	2.1	.1	(*)	2.2	1.3	(*)	(*)	1.3	13.6	5.7	.3	19.0	14.5	.2	44.1
1951	2.3	.1	(*)	2.4	1.3	(*)	(*)	1.3	15.3	5.8	.6	20.5	13.8	.3	43.3
1952	2.4	.1	(*)	2.5	1.4	(*)	(*)	1.4	15.2	5.6	.6	20.2	13.1	.2	38.9
1953	2.7	.2	(*)	2.9	1.4	(*)	(*)	1.4	16.2	5.8	.4	21.6	12.7	.4	37.3
1954	2.7	.3	(*)	3.0	1.6	(*)	(*)	1.6	16.8	5.7	.9	21.6	12.3	.4	35.7
1955	3.5	.4	(*)	3.9	1.7	0.1	(*)	1.8	19.1	6.0	1.2	23.9	11.9	.5	33.9
1956	3.6	.4	(*)	4.0	1.8	.1	(*)	1.9	20.5	6.5	1.1	25.9	11.4	.5	32.2
1957	3.6	.4	(*)	4.0	1.8	.1	(*)	1.9	20.2	6.0	1.3	24.9	10.9	.4	30.5
1958	4.1	.5	(*)	4.6	2.0	.1	(*)	2.1	20.1	5.8	1.2	24.7	10.5	.6	28.8
1959	4.8	.7	(*)	5.5	2.4	.1	(*)	2.5	22.5	6.4	1.4	27.5	10.0	.5	27.1
1960	4.6	.6	(*)	5.2	2.2	.1	(*)	2.3	23.5	6.5	2.0	28.0	9.6	.8	25.4
1961	5.2	.6	(*)	5.8	2.3	.1	(*)	2.4	24.7	6.7	2.2	29.2	9.2	1.3	23.7
1962	5.7	.7	(*)	6.4	2.6	.1	(*)	2.7	26.0	7.1	2.1	31.0	8.7	1.5	22.0
1963	6.3	.8	(*)	7.1	2.8	.2	(*)	3.0	28.0	7.0	2.4	32.6	9.6	2.7	20.6
1964	7.0	.9	(*)	7.9	3.2	.2	(*)	3.4	30.2	7.6	2.8	35.0	10.1	3.0	19.2
1965	7.5	.9	(*)	8.4	3.5	.3	(*)	3.8	31.6	8.1	2.9	36.8	10.5	3.4	17.9
1966	7.8	1.1	.1	8.8	3.7	.2	(*)	3.9	34.4	9.0	3.3	40.1	10.5	3.9	16.5
1967	7.7	1.0	.1	8.6	3.8	.2	(*)	4.0	34.4	8.6	4.1	38.9	9.6	5.5	15.2
1968	8.6	1.5	.1	10.0	4.6	.3	(*)	4.9	38.3	8.9	5.5	41.7	9.0	7.1	13.7
1969	8.0	1.7	.2	9.5	5.3	.3	0.1	5.5	40.0	9.7	6.4	43.3	8.5	6.6	12.1
1970 [2]	8.3	1.6	.1	9.8	5.4	.2	.1	5.5	40.9	9.2	7.7	42.4	7.9	7.7	10.5
1971 [2]	9.6	2.0	.2	11.4	6.7	.3	.1	6.9	40.8	9.4	6.6	43.6	8.4	6.3	9.8
1972 [2]	10.7	2.4	.2	12.9	7.9	.5	.1	8.3	42.9	8.8	7.5	44.2	8.9	8.7	9.3

*Less than 50,000 tons.

[1] Data may not add to totals because of rounding.

[2] Preliminary.

[3] Includes hardboard, insulating board, and particleboard.

[4] Excludes woodpulp used in hardboard and insulating board.

[5] Excludes veneer produced and consumed in industries other than the plywood industry.

[6] Includes both woodpulp and the woodpulp equivalent of paper and board except hardboard and insulating board.

[7] Includes pulpwood, woodpulp, and the woodpulp equivalent of paper and board except hardboard and insulating board.

[8] Includes cooperage logs, poles and piling, fence posts, hewn ties, round mine timbers, box bolts, excelsior bolts, chemical wood, shingle bolts, and miscellaneous items.

Sources: Based on data published by the U.S. Departments of Commerce and Agriculture.

TABLE 30.—*Roundwood production, imports, exports, and apparent consumption, by major product, 1950–72, with projections (medium level [1]) under alternative price assumptions to 2000*

[Billion cubic feet, roundwood equivalent]

Year	All products		Industrial roundwood used for—																			Fuelwood—domestic production and consumption [3]
			Total				Lumber				Plywood and veneer				Pulp products				Miscellaneous products [2]—domestic production and consumption [3]	Logs		
	Domestic production [3]	Apparent consumption	Domestic production [3]	Imports	Exports	Apparent consumption	Domestic production [3]	Imports	Exports	Apparent consumption	Domestic production [3]	Imports	Exports	Apparent consumption	Domestic production [3]	Imports [4]	Exports [4]	Apparent consumption		Imports	Exports	
1950	10.8	12.2	8.5	1.5	0.1	9.9	5.9	0.5	0.1	6.3	0.3	(5)	(5)	0.4	1.5	0.9	(5)	2.4	0.8	(5)	(5)	2.3
1951	11.0	12.2	8.7	1.5	.3	10.0	5.7	.4	.2	6.0	.4	(5)	(5)	.4	1.8	1.0	0.1	2.8	.7	(5)	(5)	2.2
1952	10.8	11.9	8.8	1.4	.2	9.9	5.8	.4	.1	6.1	.4	(5)	(5)	.4	1.8	.9	.1	2.7	.7	(5)	(5)	2.0
1953	10.7	11.9	8.8	1.4	.2	10.0	5.7	.4	.1	6.0	.5	(5)	(5)	.5	1.9	.9	.1	2.8	.7	(5)	(5)	1.9
1954	10.6	11.8	8.8	1.5	.3	9.9	5.6	.5	.1	6.0	.5	(5)	(5)	.5	2.0	.9	.1	2.7	.7	(5)	(5)	1.8
1955	11.0	12.2	9.2	1.6	.3	10.5	5.8	.6	.1	6.2	.6	(5)	(5)	.6	2.2	1.0	.2	3.0	.6	(5)	(5)	1.7
1956	11.3	12.6	9.6	1.6	.3	11.0	5.9	.5	.1	6.3	.6	(5)	(5)	.6	2.5	1.0	.2	3.5	.6	(5)	(5)	1.7
1957	10.2	11.3	8.6	1.5	.3	9.8	5.1	.5	.1	5.4	.6	(5)	(5)	.6	2.4	1.0	.2	3.1	.6	(5)	(5)	1.6
1958	10.0	11.2	8.5	1.5	.3	9.7	5.1	.5	.1	5.6	.6	(5)	(5)	.7	2.2	.9	.2	2.9	.6	(5)	(5)	1.5
1959	10.8	12.1	9.4	1.7	.4	10.7	5.7	.6	.1	6.3	.7	0.1	(5)	.8	2.4	1.0	.2	3.1	.5	(5)	(5)	1.4
1960	10.2	11.4	8.9	1.7	.5	10.1	5.1	.6	.1	5.5	.7	.1	(5)	.8	2.6	1.0	.3	3.3	.5	(5)	(5)	1.3
1961	10.0	11.2	8.7	1.7	.5	10.0	4.9	.7	.1	5.5	.8	.1	(5)	.8	2.5	1.0	.3	3.2	.5	(5)	0.1	1.2
1962	10.2	11.6	9.0	1.9	.5	10.4	5.1	.8	.1	5.7	.8	.1	(5)	.9	2.6	1.1	.3	3.3	.5	(5)	.1	1.1
1963	10.6	12.0	9.6	2.0	.6	10.9	5.3	.8	.1	6.0	.9	.1	(5)	1.0	2.7	1.1	.3	3.4	.5	(5)	.2	1.1
1964	11.2	12.5	10.2	2.0	.7	11.5	5.6	.8	.2	6.3	1.0	.1	(5)	1.0	2.9	1.1	.4	3.6	.5	(5)	.2	1.0
1965	11.5	12.8	10.5	2.1	.7	11.9	5.7	.8	.1	6.3	1.0	.1	(5)	1.1	3.1	1.2	.4	3.9	.6	(5)	.2	.9
1966	11.5	12.9	10.6	2.2	.8	12.1	5.6	.8	.2	6.3	1.0	.1	(5)	1.1	3.2	1.3	.4	4.1	.6	(5)	.2	.8
1967	11.2	12.4	10.4	2.2	1.0	11.6	5.3	.8	.2	6.0	1.0	.1	(5)	1.1	3.2	1.2	.5	4.0	.5	(5)	.3	.8
1968	11.7	13.0	11.0	2.4	1.1	12.3	5.6	1.0	.2	6.4	1.1	.2	(5)	1.2	3.4	1.3	.5	4.1	.5	(5)	.4	.7
1969	11.6	13.0	11.0	2.5	1.1	12.4	5.5	1.0	.2	6.3	1.0	.2	(5)	1.2	3.6	1.3	.6	4.4	.5	(5)	.4	.6
1970 [6]	11.7	12.7	11.1	2.4	1.4	12.2	5.4	1.0	.2	6.1	1.1	.2	(5)	1.2	3.8	1.3	.7	4.4	.4	(5)	.4	.5
1971 [6]	11.8	13.4	11.3	2.7	1.2	12.9	5.7	1.2	.2	6.7	1.2	.2	(5)	1.4	3.6	1.3	.6	4.3	.5	(5)	.4	.5
1972 [6]	12.6	14.2	12.1	2.9	1.3	13.7	6.1	1.5	.2	7.3	1.4	.3	(5)	1.6	3.7	1.2	.6	4.3	.5	(5)	.5	.5
Projections—1970 relative prices																						
1980	15.6	16.4	15.1	2.7	1.9	15.9	6.7	1.1	0.2	7.6	1.6	0.2	(5)	1.8	5.6	1.4	1.0	6.0	0.5	(5)	0.7	0.5
1990	18.7	19.6	18.2	2.7	1.8	19.1	7.6	1.1	.2	8.5	1.9	.2	(5)	2.1	7.5	1.4	.9	8.0	.5	(5)	.7	.5
2000	21.9	22.8	21.4	2.7	1.8	22.3	8.1	1.1	.2	9.0	2.2	.2	(5)	2.4	9.9	1.4	.9	10.4	.5	(5)	.7	.5
Projections—rising relative prices [7]																						
1980	13.5	15.2	13.0	3.6	1.9	14.7	5.3	1.5	0.2	6.6	1.4	0.2	(5)	1.6	5.1	1.9	1.0	6.0	0.5	(5)	0.7	0.5
1990	14.7	17.1	14.2	4.2	1.8	16.6	5.1	1.8	.2	6.7	1.5	.2	(5)	1.7	6.5	2.2	.9	7.8	.4	(5)	.7	.5
2000	16.4	19.2	15.9	4.6	1.8	18.7	4.7	1.9	.2	6.4	1.6	.3	(5)	1.9	8.6	2.4	.9	10.1	.3	(5)	.7	.5
Projections—relative prices above 1970 averages [8]																						
1980	12.7	14.6	12.2	3.8	1.9	14.1	4.8	1.6	0.2	6.2	1.3	0.3	(5)	1.6	5.0	1.9	1.0	5.9	0.4	(5)	0.7	0.5
1990	15.2	17.6	14.7	4.2	1.8	17.1	5.5	1.8	.2	7.1	1.5	.3	(5)	1.8	6.6	2.1	.9	7.8	.4	(5)	.7	.5
2000	18.2	20.7	17.7	4.3	1.8	20.2	6.0	1.8	.2	7.6	1.7	.3	(5)	2.0	8.9	2.2	.9	10.2	.4	(5)	.7	.5

[1] Based on the medium projections of growth in population and economic activity shown in the introductory section of this chapter.

[2] Includes cooperage logs, poles, piling, fence posts, hewn ties, round mine timbers, box bolts, excelsior bolts, chemical wood, shingle bolts, and other miscellaneous items.

[3] Data for 1980, 1990, and 2000 measure the demand on the domestic timber resource with the given projections of total timber demand, imports and exports.

[4] Includes both pulpwood and the pulpwood equivalent of woodpulp, paper, and board.

[5] Less than 50 million cubic feet.

[6] Preliminary estimates.

[7] Relative prices rising from 1970 trend levels as follows: lumber—1.5 percent per year; plywood, miscellaneous products, and fuelwood—1.0 percent per year; paper and board—0.5 percent per year.

[8] Relative price of lumber and plywood—30 percent, miscellaneous products and fuelwood—15 percent, and paper and board—10 percent, above the 1970 averages.

Note: The 1952, 1962, and 1970 data showing domestic production of all products are estimates of actual production and not directly comparable with the trend level estimates of supply shown in Chapter II. Columns may not add to totals because of rounding.

Sources: 1950–72—Based on data published by the U.S. Departments of Commerce and Agriculture.

Projections: U.S. Department of Agriculture, Forest Service.

TABLE 31.—*Softwood roundwood production, imports, exports, and apparent consumption, by major product, 1950–72, with projections (medium level [1]) under alternative price assumptions to 2000*

[Billion cubic feet, roundwood equivalent]

Year	All products		Industrial roundwood used for—																				Fuelwood—domestic production and consumption [3]
			Total				Lumber				Plywood and veneer				Pulp products				Miscellaneous products [2]—domestic production and consumption [3]	Logs		
	Domestic production [3]	Apparent consumption	Domestic production [3]	Imports	Exports	Apparent consumption	Domestic production [3]	Imports	Exports	Apparent consumption	Domestic production [3]	Imports	Exports	Apparent consumption	Domestic production [3]	Imports [4]	Exports [4]	Apparent consumption		Imports	Exports	
1950	7.1	8.4	6.6	1.4	0.1	7.9	4.8	0.5	(5)	5.2	0.2	(5)	(5)	0.2	1.3	0.9	(5)	2.1	0.4	(5)	(5)	0.5
1951	7.2	8.3	6.7	1.3	.2	7.8	4.6	.4	.1	4.8	.2	(5)	(5)	.2	1.5	1.0	(5)	2.4	.3	(5)	(5)	.5
1952	7.3	8.4	6.8	1.3	.2	7.9	4.7	.4	.1	5.0	.2	(5)	(5)	.2	1.5	.9	(5)	2.4	.3	(5)	(5)	.5
1953	7.3	8.4	6.8	1.3	.2	8.0	4.6	.4	.1	4.9	.3	(5)	(5)	.3	1.6	.9	(5)	2.4	.3	(5)	(5)	.4
1954	7.2	8.3	6.8	1.3	.2	7.9	4.5	.4	.1	4.9	.3	(5)	(5)	.3	1.6	.9	.1	2.4	.3	(5)	(5)	.4
1955	7.5	8.7	7.1	1.4	.3	8.3	4.6	.5	.1	5.0	.4	(5)	(5)	.4	1.8	.9	.2	2.6	.3	(5)	(5)	.4
1956	7.8	9.0	7.4	1.5	.3	8.7	4.7	.5	.1	5.1	.4	(5)	(5)	.4	2.0	1.0	.1	2.9	.3	(5)	(5)	.4
1957	7.1	8.2	6.8	1.3	.3	7.9	4.2	.5	.1	4.5	.4	(5)	(5)	.4	1.9	.9	.2	2.6	.3	(5)	(5)	.3
1958	7.0	8.1	6.7	1.3	.2	7.8	4.2	.5	.1	4.7	.5	(5)	(5)	.5	1.7	.8	.1	2.4	.3	(5)	(5)	.3
1959	7.7	8.9	7.4	1.5	.3	8.6	4.7	.6	.1	5.2	.6	(5)	(5)	.6	1.8	.9	.2	2.6	.3	(5)	(5)	.3
1960	7.2	8.3	6.9	1.5	.4	8.1	4.1	.6	.1	4.6	.6	(5)	(5)	.6	2.0	.9	.2	2.7	.3	(5)	(5)	.3
1961	7.0	8.2	6.8	1.6	.4	8.0	4.0	.6	.1	4.6	.6	(5)	(5)	.6	1.8	.9	.2	2.6	.2	(5)	.1	.2
1962	7.2	8.5	7.0	1.7	.4	8.3	4.1	.7	.1	4.8	.6	(5)	(5)	.6	1.9	1.0	.2	2.6	.2	(5)	.1	.2
1963	7.5	8.8	7.3	1.8	.5	8.6	4.3	.8	.1	4.9	.7	(5)	(5)	.7	1.9	1.0	.3	2.7	.3	(5)	.1	.2
1964	8.0	9.2	7.8	1.8	.6	9.0	4.5	.8	.1	5.2	.8	(5)	(5)	.8	2.0	1.0	.3	2.8	.3	(5)	.2	.2
1965	8.3	9.6	8.1	1.9	.6	9.4	4.5	.8	.1	5.2	.9	(5)	(5)	.9	2.2	1.1	.3	3.0	.3	(5)	.2	.2
1966	8.3	9.6	8.1	2.0	.7	9.4	4.5	.7	.1	5.1	.9	(5)	(5)	.9	2.2	1.2	.3	3.1	.3	(5)	.2	.2
1967	8.2	9.3	8.0	1.9	.8	9.1	4.2	.8	.2	4.8	.9	(5)	(5)	.9	2.3	1.2	.4	3.1	.3	(5)	.3	.2
1968	8.8	9.9	8.6	2.1	1.0	9.8	4.5	.9	.2	5.3	1.0	(5)	(5)	1.0	2.4	1.2	.4	3.2	.3	(5)	.4	.1
1969	8.6	9.8	8.5	2.1	1.0	9.6	4.4	.9	.2	5.2	.9	(5)	(5)	.9	2.5	1.2	.4	3.3	.3	(5)	.4	.1
1970 [6]	8.8	9.7	8.7	2.1	1.2	9.6	4.3	.9	.2	5.0	1.0	(5)	(5)	.9	2.8	1.2	.5	3.4	.2	(5)	.4	.1
1971 [6]	9.0	10.3	8.9	2.4	1.0	10.2	4.7	1.1	.1	5.6	1.1	(5)	(5)	1.1	2.5	1.2	.5	3.3	.2	(5)	.4	.1
1972 [6]	9.6	11.0	9.5	2.5	1.1	10.9	5.0	1.4	.2	6.2	1.2	(5)	(5)	1.2	2.6	1.1	.5	3.2	.3	(5)	.5	.1
Projections—1970 relative prices																						
1980	11.5	12.1	11.4	2.3	1.7	12.0	5.3	1.0	0.2	6.1	1.4	(5)	(5)	1.4	3.7	1.3	0.8	4.2	0.3	(5)	0.7	0.1
1990	13.4	14.1	13.3	2.3	1.6	14.0	5.9	1.0	.2	6.7	1.7	(5)	(5)	1.7	4.7	1.3	.7	5.3	.3	(5)	.7	.1
2000	15.1	15.8	15.0	2.3	1.6	15.7	6.2	1.0	.2	7.0	1.9	(5)	(5)	1.9	5.9	1.3	.7	6.5	.3	(5)	.7	.1
Projections—rising relative prices [7]																						
1980	9.8	11.2	9.7	3.1	1.7	11.1	4.1	1.4	0.2	5.3	1.3	(5)	(5)	1.3	3.3	1.7	0.8	4.2	0.3	(5)	0.7	0.1
1990	10.3	12.4	10.2	3.7	1.6	12.3	3.8	1.7	.2	5.3	1.4	(5)	(5)	1.4	4.1	2.0	.7	5.4	.2	(5)	.7	.1
2000	11.1	13.5	11.0	4.0	1.6	13.4	3.4	1.8	.2	5.0	1.5	(5)	(5)	1.5	5.2	2.2	.7	6.7	.2	(5)	.7	.1
Projections—relative prices above 1970 averages [8]																						
1980	9.2	10.7	9.1	3.2	1.7	10.6	3.7	1.5	0.2	5.0	1.2	(5)	(5)	1.2	3.3	1.7	0.8	4.2	0.2	(5)	0.7	0.1
1990	10.7	12.7	10.6	3.6	1.6	12.6	4.1	1.7	.2	5.6	1.4	(5)	(5)	1.4	4.2	1.9	.7	5.4	.2	(5)	.7	.1
2000	12.2	14.3	12.1	3.7	1.6	14.2	4.4	1.7	.2	5.9	1.5	(5)	(5)	1.5	5.3	2.0	.7	6.6	.2	(5)	.7	.1

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[1] Based on the medium projections of growth in population and economic activity shown in the introductory section of this chapter.

[2] Includes cooperage logs, poles, piling, fence posts, hewn ties, round mine timbers, box bolts, excelsior bolts, chemical wood, shingle bolts, and other miscellaneous items.

[3] Data for 1980, 1990, and 2000 measure the demand on the domestic timber resource with the given projections of total timber demand, imports and exports.

[4] Includes both pulpwood and the pulpwood equivalent of woodpulp, paper, and board.

[5] Less than 50 million cubic feet.

[6] Preliminary estimates.

[7] Relative prices rising from 1970 trend levels as follows: lumber—1.5 percent per year; plywood, miscellaneous products, and fuelwood—1.0 percent per year; paper and board—0.5 percent per year.

[8] Relative price of lumber and plywood—30 percent, miscellaneous products and fuelwood—15 percent, and paper and board—10 percent, above the 1970 averages.

Note: The 1952, 1962, and 1970 data showing domestic production of all products are estimates of actual production and not directly comparable with the trend level estimates of supply shown in Chapter II. Columns may not add to totals because of rounding.

Sources: 1950–72—Based on data published by the U.S. Departments of Commerce and Agriculture.

Projections: U.S. Department of Agriculture, Forest Service.

TABLE 32.—*Hardwood roundwood production, imports, exports, and apparent consumption, by major product, 1950–72, with projections (medium level [1]) under alternative price assumptions to 2000*

[Billion cubic feet, roundwood equivalent]

Year	All products		Industrial roundwood used for—																			Fuelwood—domestic production and consumption [3]
			Total				Lumber				Plywood and veneer				Pulp products				Miscellaneous products [2]—domestic production and consumption [3]	Logs		
	Domestic production [3]	Apparent consumption	Domestic production [3]	Imports	Exports	Apparent consumption	Domestic production [3]	Imports	Exports	Apparent consumption	Domestic production [3]	Imports	Exports	Apparent consumption	Domestic production [3]	Imports [4]	Exports [4]	Apparent consumption		Imports	Exports	
1950	3.6	3.7	1.9	0.1	(5)	2.0	1.1	(5)	(5)	1.1	0.2	(5)	(5)	0.2	0.2	0.1	(5)	0.3	0.4	(5)	(5)	1.7
1951	3.8	3.8	2.0	.1	(5)	2.2	1.2	(5)	(5)	1.2	.2	(5)	(5)	.2	.3	.1	(5)	.3	.4	(5)	(5)	1.7
1952	3.5	3.5	1.9	.1	(5)	2.0	1.1	(5)	(5)	1.1	.2	(5)	(5)	.2	.3	.1	(5)	.3	.4	(5)	(5)	1.5
1953	3.4	3.5	2.0	.1	(5)	2.0	1.1	(5)	(5)	1.1	.2	(5)	(5)	.2	.3	.1	(5)	.4	.4	(5)	(5)	1.5
1954	3.4	3.4	1.9	.1	(5)	2.0	1.1	(5)	(5)	1.1	.2	(5)	(5)	.2	.4	.1	(5)	.4	.3	(5)	(5)	1.4
1955	3.4	3.5	2.1	.2	0.1	2.2	1.1	(5)	(5)	1.2	.2	(5)	(5)	.2	.4	.1	(5)	.4	.3	(5)	(5)	1.4
1956	3.5	3.6	2.2	.2	.1	2.3	1.2	(5)	(5)	1.2	.2	(5)	(5)	.2	.5	.1	(5)	.5	.3	(5)	(5)	1.3
1957	3.1	3.2	1.8	.2	.1	1.9	.9	(5)	(5)	.9	.2	(5)	(5)	.2	.5	.1	(5)	.5	.3	(5)	(5)	1.2
1958	3.0	3.1	1.8	.2	.1	1.9	.9	(5)	(5)	.9	.2	(5)	(5)	.2	.4	.1	(5)	.5	.3	(5)	(5)	1.2
1959	3.1	3.2	2.0	.2	.1	2.1	1.0	(5)	(5)	1.0	.2	0.1	(5)	.2	.6	.1	(5)	.6	.3	(5)	(5)	1.1
1960	3.0	3.1	2.0	.2	.1	2.1	.9	(5)	(5)	1.0	.2	.1	(5)	.2	.6	.1	0.1	.6	.3	(5)	(5)	1.0
1961	2.9	3.0	1.9	.2	.1	2.0	.9	(5)	(5)	.9	.2	.1	(5)	.2	.6	.1	.1	.6	.2	(5)	(5)	1.0
1962	3.0	3.1	2.1	.2	.1	2.2	1.0	(5)	(5)	1.0	.2	.1	(5)	.2	.7	.1	.1	.7	.2	(5)	(5)	.9
1963	3.1	3.2	2.2	.2	.1	2.3	1.1	(5)	(5)	1.1	.1	.1	(5)	.2	.7	.1	.1	.7	.2	(5)	(5)	.9
1964	3.1	3.2	2.4	.2	.1	2.4	1.1	(5)	(5)	1.1	.2	.1	(5)	.2	.8	.1	.1	.8	.3	(5)	(5)	.8
1965	3.2	3.3	2.4	.2	.1	2.5	1.1	(5)	(5)	1.2	.2	.1	(5)	.3	.9	.1	.1	.8	.3	(5)	(5)	.7
1966	3.2	3.3	2.5	.3	.1	2.7	1.2	0.1	(5)	1.2	.1	.1	(5)	.2	.9	.1	.1	.9	.3	(5)	(5)	.7
1967	3.0	3.1	2.4	.2	.1	2.5	1.1	(5)	(5)	1.2	.1	.1	(5)	.2	.9	.1	.1	.9	.2	(5)	(5)	.6
1968	3.0	3.1	2.4	.3	.2	2.6	1.1	.1	(5)	1.1	.1	.2	(5)	.3	.9	.1	.1	.9	.2	(5)	(5)	.6
1969	3.0	3.2	2.5	.4	.2	2.7	1.1	.1	(5)	1.2	.1	.2	(5)	.3	1.0	.1	.1	1.0	.2	(5)	(5)	.5
1970 [6]	2.9	3.0	2.5	.3	.2	2.6	1.1	.1	(5)	1.1	.1	.2	(5)	.3	1.1	.1	.2	1.0	.2	(5)	(5)	.4
1971 [6]	2.8	3.0	2.4	.4	.2	2.6	1.1	.1	(5)	1.1	.1	.2	(5)	.3	1.0	.1	.2	1.0	.2	(5)	(5)	.4
1972 [6]	3.0	3.2	2.6	.4	.2	2.8	1.1	.1	(5)	1.1	.2	.3	(5)	.4	1.1	.1	.1	1.0	.2	(5)	(5)	.4
Projections—1970 relative prices																						
1980	4.1	4.3	3.7	0.4	0.2	3.9	1.4	0.1	(5)	1.5	0.2	0.2	(5)	0.4	1.9	0.1	0.2	1.8	0.2	(5)	(5)	0.4
1990	5.3	5.5	4.9	.4	.2	5.1	1.7	.1	(5)	1.8	.2	.2	(5)	.4	2.8	.1	.2	2.7	.2	(5)	(5)	.4
2000	6.8	7.0	6.4	.4	.2	6.6	1.9	.1	(5)	2.0	.3	.2	(5)	.5	4.0	.1	.2	3.9	.2	(5)	(5)	.4
Projections—rising relative prices [7]																						
1980	3.7	4.0	3.3	0.5	0.2	3.6	1.2	0.1	(5)	1.3	0.1	0.2	(5)	0.3	1.8	0.2	0.2	1.8	0.2	(5)	(5)	0.4
1990	4.4	4.7	4.0	.5	.2	4.3	1.3	.1	(5)	1.4	.1	.2	(5)	.3	2.4	.2	.2	2.4	.2	(5)	(5)	.4
2000	5.3	5.7	4.9	.6	.2	5.3	1.3	.1	(5)	1.4	.1	.3	(5)	.4	3.4	.2	.2	3.4	.1	(5)	(5)	.4
Projections—relative prices above 1970 averages [8]																						
1980	3.5	3.9	3.1	0.6	0.2	3.5	1.1	0.1	(5)	1.2	0.1	0.3	(5)	0.4	1.7	0.2	0.2	1.7	0.2	(5)	(5)	0.4
1990	4.5	4.9	4.1	.6	.2	4.5	1.4	.1	(5)	1.5	.1	.3	(5)	.4	2.4	.2	.2	2.4	.2	(5)	(5)	.4
2000	6.0	6.4	5.6	.6	.2	6.0	1.6	.1	(5)	1.7	.2	.3	(5)	.5	3.6	.2	.2	3.6	.2	(5)	(5)	.4

[1] Based on the medium projections of growth in population and economic activity shown in the introductory section of this chapter.

[2] Includes cooperage logs, poles, piling, fence posts, hewn ties, round mine timbers, box bolts, excelsior bolts, chemical wood, shingle bolts, and other miscellaneous items.

[3] Data for 1980, 1990, and 2000 measure the demand on the domestic timber resource with the given projections of total timber demand, imports and exports.

[4] Includes both pulpwood and the pulpwood equivalent of woodpulp, paper, and board.

[5] Less than 50 million cubic feet.

[6] Preliminary estimates.

[7] Relative prices rising from 1970 trend levels as follows: lumber—1.5 percent per year; plywood, miscellaneous products, and fuelwood—1.0 percent per year; paper and board—0.5 percent per year.

[8] Relative price of lumber and plywood—30 percent, miscellaneous products and fuelwood—15 percent, and paper and board—10 percent, above the 1970 averages.

Note: The 1952, 1962, and 1970 data showing domestic production of all products are estimates of actual production and not directly comparable with the trend level estimates of supply shown in Chapter II. Columns may not add to totals because of rounding.

Sources: 1950–72—Based on data published by the U.S. Departments of Commerce and Agriculture.

Projections: U.S. Department of Agriculture, Forest Service.

TABLE 33.—*Sawtimber production, imports, exports, and apparent consumption, by major product 1950–72, with projections (medium level*[1]*) under alternative price assumptions to 2000*

[Billion board feet, International ¼-inch log rule]

Year	All products		Industrial sawtimber used for—																	Fuelwood—domestic production and consumption[3]
			Total				Lumber				Plywood and veneer				Pulp products—domestic production and consumption[3]	Miscellaneous products[2]—domestic production and consumption[3]	Logs		
	Domestic production[3]	Apparent consumption	Domestic production[3]	Imports	Exports	Apparent consumption	Domestic production[3]	Imports	Exports	Apparent consumption	Domestic production[3]	Imports	Exports	Apparent consumption			Imports	Exports	
1950	49.4	52.5	46.8	3.7	0.5	49.9	37.7	3.4	0.5	40.6	2.5	(4)	(4)	2.5	3.9	2.6	0.3	0.1	2.6
1951	49.7	51.4	47.2	2.8	1.1	48.9	37.0	2.5	1.0	38.5	2.9	(4)	(4)	2.9	4.7	2.5	.3	.1	2.5
1952	49.7	51.6	47.4	2.7	.8	49.3	37.2	2.5	.7	39.0	3.0	(4)	(4)	3.0	4.7	2.4	.2	.1	2.3
1953	49.5	52.0	47.4	3.2	.7	49.9	36.6	2.8	.6	38.8	3.3	0.1	(4)	3.4	5.0	2.4	.3	.1	2.1
1954	49.1	51.9	47.4	3.7	.9	50.2	36.2	3.1	.7	38.6	3.2	.3	(4)	3.5	5.2	2.6	.3	.2	1.7
1955	51.4	54.5	49.9	4.1	1.0	53.0	37.2	3.6	.8	40.0	4.1	.3	(4)	4.4	5.8	2.6	.2	.2	1.5
1956	52.7	55.7	51.4	4.0	1.0	54.4	38.1	3.4	.8	40.7	4.0	.4	(4)	4.4	6.5	2.6	.2	.2	1.3
1957	47.2	49.9	46.0	3.7	1.0	48.7	32.8	3.0	.8	35.0	4.1	.5	(4)	4.6	6.5	2.4	.2	.2	1.2
1958	47.1	50.1	46.0	3.9	.9	49.0	33.3	3.4	.7	36.0	4.5	.4	(4)	4.9	5.8	2.2	.1	.2	1.1
1959	52.9	55.8	51.0	4.9	1.1	54.8	37.1	4.1	.8	40.4	5.1	.7	(4)	5.8	6.4	2.1	.1	.3	1.0
1960	48.1	51.4	47.2	4.5	1.2	50.5	32.9	3.9	.9	35.9	5.0	.5	(4)	5.5	7.1	1.9	.1	.3	.9
1961	47.5	51.0	46.6	4.9	1.4	50.1	32.0	4.3	.8	35.5	5.4	.5	(4)	5.9	6.9	1.7	.1	.6	.9
1962	49.2	53.3	48.4	5.6	1.5	52.5	33.1	1.9	.8	37.2	5.9	.6	(4)	6.5	7.2	1.5	.1	.7	.8
1963	52.1	56.0	51.4	6.0	2.1	55.3	34.7	5.3	.9	39.1	6.5	.6	(4)	7.1	7.3	1.7	.1	1.2	.7
1964	55.1	58.6	54.4	5.9	2.4	57.9	36.5	5.2	1.0	40.7	7.1	.6	(4)	7.7	7.8	1.6	.1	1.4	.7
1965	56.1	59.6	55.5	5.9	2.4	59.0	36.7	5.2	.9	41.0	7.4	.6	(4)	8.0	8.2	1.7	.1	1.5	.6
1966	56.4	59.7	55.8	6.0	2.7	59.1	36.4	5.2	1.0	40.6	7.5	.7	(4)	8.2	8.5	1.7	.1	1.7	.6
1967	54.9	57.1	54.4	5.8	3.6	56.6	34.7	5.1	1.1	38.7	7.3	.6	(4)	7.9	8.2	1.7	.1	2.5	.5
1968	58.5	61.3	58.0	7.2	4.4	60.8	36.5	6.2	1.2	41.5	8.0	.9	(4)	8.9	8.6	1.7	.1	3.2	.5
1969	57.3	60.6	56.9	7.4	4.1	60.2	35.8	6.3	1.1	41.0	7.4	1.0	0.1	8.4	9.0	1.7	.1	3.0	.4
1970[5]	57.3	59.9	56.9	7.3	4.7	59.5	34.1	6.1	1.3	38.9	7.5	1.0	(4)	8.6	10.2	1.7	.2	3.4	.4
1971[5]	57.6	62.5	57.2	8.9	4.0	62.1	34.6	7.6	1.1	41.1	8.6	1.2	(4)	9.8	9.4	1.7	.1	2.9	.4
1972[5]	62.6	68.1	62.2	10.9	5.4	67.7	37.2	9.4	1.5	45.1	9.7	1.5	(4)	11.2	9.6	1.8	(4)	3.9	.4
Projections—1970 relative prices																			
1980	72.4	75.2	72.0	8.6	5.8	74.8	41.7	6.9	1.2	47.4	11.0	1.5	(4)	12.5	13.0	1.7	0.2	4.6	0.4
1990	84.1	86.8	83.7	8.5	5.8	86.4	47.2	6.8	1.2	52.8	13.1	1.5	(4)	14.6	17.1	1.7	.2	4.6	.4
2000	94.3	96.9	93.9	8.4	5.8	96.5	50.2	6.7	1.2	55.7	15.0	1.5	(4)	16.5	22.4	1.7	.2	4.6	.4
Projections—rising relative prices[6]																			
1980	60.9	66.0	60.5	10.9	5.8	65.6	32.9	9.3	1.2	41.0	9.7	1.4	(4)	11.1	11.7	1.6	0.2	4.6	0.4
1990	63.5	70.8	63.1	13.1	5.8	70.4	31.4	11.3	1.2	41.5	10.7	1.6	(4)	12.3	14.9	1.5	.2	4.6	.4
2000	65.7	74.1	65.3	14.1	5.7	73.7	28.9	12.2	1.1	40.0	10.9	1.7	(4)	12.6	19.5	1.4	.2	4.6	.4
Projections—relative prices above 1970 averages[7]																			
1980	56.5	62.7	56.1	12.0	5.8	62.3	30.0	10.1	1.2	38.9	8.5	1.7	(4)	10.2	11.4	1.6	0.2	4.6	0.4
1990	65.8	73.2	65.4	13.2	5.8	72.8	34.0	11.3	1.2	44.1	10.2	1.7	(4)	11.9	15.0	1.6	.2	4.6	.4
2000	75.6	83.0	75.2	13.2	5.8	82.6	37.1	11.3	1.2	47.2	11.6	1.7	(4)	13.3	20.3	1.6	.2	4.6	.4

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[1] Based on the medium projections of growth in population and economic activity shown in the introductory section of this chapter.

[2] Includes cooperage logs, poles, piling, fence posts, hewn ties, round mine timbers, box bolts, excelsior bolts, chemical wood, shingle bolts, and other miscellaneous items.

[3] Data for 1980, 1990, and 2000 measure the demand on the domestic timber resource with the given projections of total timber demand, imports and exports.

[4] Less than 50 million board feet.

[5] Preliminary estimates.

[6] Relative prices rising from 1970 trend levels as follows: lumber—1.5 percent per year; plywood, miscellaneous products, and fuelwood—1.0 percent per year; paper and board—0.5 percent per year.

[7] Relative prices of lumber and plywood—30 percent, miscellaneous products and fuelwood—15 percent, and paper and board—10 percent, above the 1970 averages.

Note: The 1952, 1962, and 1970 data showing domestic production of all products are estimates of actual production and not directly comparable with the trend level estimates of supply shown in Chapter II. Columns may not add to totals because of rounding.

Sources: 1950–72—Based on data published by the U.S. Departments of Commerce and Agriculture.

Projections: U.S. Department of Agriculture, Forest Service.

TABLE 34.—*Softwood sawtimber production, imports, exports, and apparent consumption, by major product, 1950–72, with projections (medium level [1]) under alternative price assumptions to 2000*

[Billion board feet, International ¼-inch log rule]

Year	All products		Industrial sawtimber used for—																Fuelwood—domestic production and consumption [3]
			Total				Lumber				Plywood and veneer				Pulp products—domestic production and consumption [3]	Miscellaneous products [2]—domestic production and consumption [3]	Logs		
	Domestic production [3]	Apparent consumption	Domestic production [3]	Imports	Exports	Apparent consumption	Domestic production [3]	Imports	Exports	Apparent consumption	Domestic production [3]	Imports	Exports	Apparent consumption			Imports	Exports	
1950	37.6	40.5	36.9	3.3	0.4	39.8	30.4	3.1	0.4	33.1	1.6	(4)	(4)	1.6	3.6	1.3	0.2	(4)	0.7
1951	37.5	38.9	36.8	2.4	1.0	38.2	29.4	2.3	.9	30.8	1.8	(4)	(4)	1.8	4.3	1.2	.1	0.1	.7
1952	38.1	39.9	37.6	2.4	.7	39.3	30.1	2.3	.6	31.8	1.9	(4)	(4)	1.9	4.3	1.2	.1	.1	.6
1953	38.0	40.0	37.5	2.6	.6	39.5	29.5	2.5	.5	31.5	2.2	(4)	(4)	2.2	4.4	1.3	.1	.1	.5
1954	37.8	40.2	37.5	3.1	.7	39.9	29.2	2.9	.6	31.5	2.3	(4)	(4)	2.3	4.5	1.4	.2	.1	.3
1955	39.6	42.1	39.4	3.4	.9	41.9	29.7	3.3	.7	32.3	3.0	(4)	(4)	3.0	5.0	1.5	.1	.2	.2
1956	40.5	42.9	40.4	3.2	.8	42.8	30.2	3.2	.6	32.8	3.0	(4)	(4)	3.0	5.5	1.5	(4)	.2	.1
1957	37.0	39.1	36.9	2.8	.7	39.0	27.1	2.7	.6	29.2	3.2	(4)	(4)	3.2	5.1	1.4	.1	.1	.1
1958	37.3	39.7	37.2	3.2	.8	39.6	27.4	3.2	.6	30.0	3.6	(4)	(4)	3.6	4.7	1.3	(4)	.2	.1
1959	41.1	44.1	41.0	3.8	.8	44.0	30.5	3.8	.6	33.7	4.2	(4)	(4)	4.2	4.9	1.2	(4)	.2	.1
1960	37.6	40.3	37.5	3.6	.9	40.2	26.7	3.6	.7	29.6	4.2	(4)	(4)	4.2	5.3	1.1	(4)	.2	.1
1961	37.1	40.1	37.0	4.1	1.1	40.0	26.0	4.0	.6	29.4	4.5	(4)	(4)	4.5	5.0	1.0	.1	.5	.1
1962	38.3	41.7	38.2	4.6	1.2	41.6	26.8	4.6	.6	30.8	4.9	(4)	(4)	4.9	5.0	.9	(4)	.6	.1
1963	40.3	43.5	40.2	5.1	1.8	43.4	27.6	5.0	.7	31.8	5.4	(4)	(4)	5.4	5.1	1.0	.1	1.1	.1
1964	43.2	46.0	43.1	4.9	2.1	45.9	29.3	4.9	.8	33.4	6.0	(4)	(4)	6.0	5.5	1.0	(4)	1.3	.1
1965	44.0	46.7	43.9	4.9	2.2	46.6	29.3	4.9	.8	33.4	6.3	(4)	(4)	6.3	5.9	1.0	(4)	1.4	.1
1966	43.9	46.3	43.8	4.9	2.5	46.2	28.8	4.8	.9	32.7	6.4	(4)	(4)	6.4	6.0	1.0	.1	1.6	.1
1967	43.0	44.5	42.9	4.8	3.3	44.4	27.3	4.8	1.0	31.1	6.3	(4)	(4)	6.3	6.0	1.0	(4)	2.3	.1
1968	46.9	48.6	46.8	5.8	4.1	48.5	29.3	5.8	1.0	34.1	7.0	(4)	(4)	7.0	6.4	1.0	(4)	3.1	.1
1969	45.5	47.4	45.4	6.0	4.0	47.4	28.3	5.9	1.0	33.2	6.5	(4)	0.1	6.4	6.7	1.0	.1	2.9	.1
1970 [5]	46.2	47.6	46.1	5.9	4.6	47.5	27.0	5.8	1.2	31.6	6.7	(4)	(4)	6.8	8.0	1.0	.1	3.4	.1
1971 [5]	46.9	50.5	46.8	7.3	3.7	50.4	28.0	7.2	.9	34.3	7.8	(4)	(4)	7.8	7.2	1.0	.1	2.8	.1
1972 [5]	51.4	55.4	51.3	9.0	5.0	55.3	30.3	9.0	1.2	38.1	8.7	(4)	(4)	8.7	7.4	1.1	(4)	3.8	.1
Projections—1970 relative prices																			
1980	57.9	58.9	57.8	6.6	5.6	58.8	33.1	6.5	1.1	38.5	10.0	(4)	(4)	10.0	9.2	1.0	0.1	4.5	0.1
1990	65.6	66.5	65.5	6.5	5.6	66.4	36.9	6.4	1.1	42.2	11.5	(4)	(4)	11.5	11.6	1.0	.1	4.5	.1
2000	71.8	72.6	71.7	6.4	5.6	72.5	38.7	6.3	1.1	43.9	13.0	(4)	(4)	13.0	14.5	1.0	.1	4.5	.1
Projections—rising relative prices [6]																			
1980	48.2	51.5	48.1	8.9	5.6	51.4	25.6	8.8	1.1	33.3	8.9	(4)	(4)	8.9	8.2	0.9	0.1	4.5	0.1
1990	48.9	54.1	48.8	10.8	5.6	54.0	23.5	10.7	1.1	33.1	9.8	(4)	(4)	9.8	10.1	.9	.1	4.5	.1
2000	49.1	55.0	49.0	11.4	5.5	54.9	21.1	11.3	1.0	31.4	10.0	(4)	(4)	10.0	12.6	.8	.1	4.5	.1
Projections—relative prices above 1970 averages [7]																			
1980	44.7	48.7	44.6	9.6	5.6	48.6	23.1	9.5	1.1	31.5	8.1	(4)	(4)	8.1	8.0	0.9	0.1	4.5	0.1
1990	50.6	55.8	50.5	10.8	5.6	55.7	25.5	10.7	1.1	35.1	9.4	(4)	(4)	9.4	10.2	.9	.1	4.5	.1
2000	56.7	61.9	56.6	10.8	5.6	61.8	27.5	10.7	1.1	37.1	10.6	(4)	(4)	10.6	13.1	.9	.1	4.5	.1

[1] Based on the medium projections of growth in population and economic activity shown in the introductory section of this chapter.

[2] Includes cooperage logs, poles, piling, fence posts, hewn ties, round mine timbers, box bolts, excelsior bolts, chemical wood, shingle bolts, and other miscellaneous items.

[3] Data for 1980, 1990, and 2000 measure the demand on the domestic timber resource with the given projections of total timber demand, imports and exports.

[4] Less than 50 million board feet.

[5] Preliminary estimates.

[6] Relative prices rising from 1970 trend levels as follows: lumber—1.5 percent per year; plywood, miscellaneous products, and fuelwood—1.0 percent per year; paper and board—0.5 percent per year.

[7] Relative prices of lumber and plywood—30 percent, miscellaneous products and fuelwood—15 percent, and paper and board—10 percent, above the 1970 averages.

Note: The 1952, 1962, and 1970 data showing domestic production of all products are estimates of actual production and not directly comparable with the trend level estimates of supply shown in Chapter II. Columns may not add to totals because of rounding.

Sources: 1950–72—Based on data published by the U.S. Departments of Commerce and Agriculture.

Projections: U.S. Department of Agriculture, Forest Service.

TABLE 35.—*Hardwood sawtimber production, imports, exports, and apparent consumption, by major product 1950–72, with projections (medium level* [1]*) under alternative price assumptions to 2000*

[Billion board feet, International ¼-inch log rule]

Year	All products		Industrial sawtimber used for—																Fuelwood—domestic production and consumption [3]
			Total				Lumber				Plywood and veneer				Pulp products—domestic production and consumption [3]	Miscellaneous products [2]—domestic production and consumption [3]	Logs		
	Domestic production [3]	Apparent consumption	Domestic production [3]	Imports	Exports	Apparent consumption	Domestic production [3]	Imports	Exports	Apparent consumption	Domestic production [3]	Imports	Exports	Apparent consumption			Imports	Exports	
1950	11.7	12.0	9.8	0.4	0.1	10.1	7.3	0.3	0.1	7.5	0.9	(4)	(4)	0.9	0.3	1.3	0.1	(4)	1.9
1951	12.2	12.6	10.4	.5	.1	10.8	7.6	.3	.1	7.8	1.1	(4)	(4)	1.1	.4	1.3	.2	(4)	1.8
1952	11.5	11.6	9.8	.3	.2	9.9	7.1	.2	.2	7.1	1.1	(4)	(4)	1.1	.4	1.2	.1	(4)	1.7
1953	11.5	11.8	9.9	.4	.1	10.2	7.1	.2	.1	7.2	1.1	0.1	(4)	1.2	.6	1.1	.1	(4)	1.6
1954	11.2	11.7	9.8	.6	.1	10.3	7.0	.2	.1	7.1	.9	.3	(4)	1.2	.7	1.2	.1	(4)	1.4
1955	11.8	12.3	10.5	.7	.2	11.0	7.5	.3	.2	7.6	1.1	.3	(4)	1.4	.8	1.1	.1	(4)	1.3
1956	12.2	12.9	11.0	.9	.2	11.7	7.9	.3	.2	8.0	1.0	.4	(4)	1.4	1.0	1.1	.2	(4)	1.2
1957	9.8	10.4	8.7	.8	.2	9.3	5.7	.2	.2	5.7	.9	.5	(4)	1.4	1.1	1.0	.1	(4)	1.1
1958	9.8	10.3	8.8	.7	.2	9.3	5.9	.2	.2	5.9	.9	.4	(4)	1.3	1.1	.9	.1	(4)	1.0
1959	10.8	11.7	9.9	1.1	.2	10.8	6.6	.3	.2	6.7	.9	.7	(4)	1.6	1.5	.9	.1	(4)	.9
1960	10.6	11.1	9.7	.9	.3	10.3	6.2	.3	2	6.3	.8	.5	(4)	1.3	1.8	.8	.1	0.1	.8
1961	10.4	10.9	9.6	.8	.3	10.1	6.0	.2	.2	6.0	.9	.5	(4)	1.4	1.9	.7	.1	.1	.8
1962	10.9	11.7	10.2	1.0	.2	11.0	6.3	.3	.1	6.5	1.0	.6	(4)	1.6	2.2	.6	.1	.1	.7
1963	11.8	12.6	11.2	1.0	.2	12.0	7.1	.3	.1	7.3	1.1	.6	(4)	1.7	2.2	.7	.1	.1	.6
1964	11.9	12.7	11.3	1.0	.2	12.1	7.2	.3	.1	7.4	1.1	.6	(4)	1.7	2.3	.6	.1	.1	.6
1965	12.1	12.9	11.6	1.0	.2	12.4	7.4	.3	.1	7.6	1.1	.6	(4)	1.7	2.3	.7	.1	.1	.5
1966	12.5	13.4	12.0	1.2	.3	12.9	7.6	.4	.2	7.8	1.1	.7	(4)	1.8	2.5	.7	.1	.1	.5
1967	11.8	12.5	11.4	1.0	.3	12.1	7.4	.3	.2	7.5	1.0	.6	(4)	1.6	2.2	.7	.1	.1	.4
1968	11.6	12.7	11.2	1.3	.2	12.3	7.2	.3	.1	7.4	1.0	.9	(4)	1.9	2.2	.7	.1	.1	.4
1969	11.8	13.1	11.5	1.5	.2	12.8	7.5	.4	.1	7.8	.9	1.0	(4)	1.9	2.3	.7	.1	.1	.3
1970 [5]	11.2	12.3	10.9	1.3	.2	12.0	7.1	.3	.1	7.3	.8	1.0	(4)	1.8	2.2	.7	(4)	.1	.3
1971 [5]	10.7	12.0	10.4	1.6	.3	11.7	6.6	.4	.2	6.8	.8	1.2	(4)	2.0	2.2	.7	(4)	.1	.3
1972 [5]	11.2	12.7	10.9	1.9	.4	12.4	6.9	.4	.3	7.0	1.0	1.5	(4)	2.5	2.2	.7	(4)	.1	.3
Projections—1970 relative prices																			
1980	14.5	16.3	14.2	2.0	0.2	16.0	8.6	0.4	0.1	8.9	1.0	1.5	(4)	2.5	3.8	0.7	0.1	0.1	0.3
1990	18.5	20.3	18.2	2.0	.2	20.0	10.3	.4	.1	10.6	1.6	1.5	(4)	3.1	5.5	.7	.1	.1	.3
2000	22.5	24.3	22.2	2.0	.2	24.0	11.5	.4	.1	11.8	2.0	1.5	(4)	3.5	7.9	.7	.1	.1	.3
Projections—rising relative prices [6]																			
1980	12.7	14.5	12.4	2.0	0.2	14.2	7.3	0.5	0.1	7.7	0.8	1.4	(4)	2.2	3.5	0.7	0.1	0.1	0.3
1990	14.6	16.7	14.3	2.3	.2	16.4	7.9	.6	.1	8.4	.9	1.6	(4)	2.5	4.8	.6	.1	.1	.3
2000	16.6	19.1	16.3	2.7	.2	18.8	7.8	.9	.1	8.6	.9	1.7	(4)	2.6	6.9	.6	.1	.1	.3
Projections—relative prices above 1970 averages [7]																			
1980	11.8	14.0	11.5	2.4	0.2	13.7	6.9	0.6	0.1	7.4	0.4	1.7	(4)	2.1	3.4	0.7	0.1	0.1	0.3
1990	15.2	17.4	14.9	2.4	.2	17.1	8.5	.6	.1	9.0	.8	1.7	(4)	2.5	4.8	.7	.1	.1	.3
2000	18.9	21.1	18.6	2.4	.2	20.8	9.6	.6	.1	10.1	1.0	1.7	(4)	2.7	7.2	.7	.1	.1	.3

[1] Based on the medium projections of growth in population and economic activity shown in the introductory section of this chapter.

[2] Includes cooperage logs, poles, piling, fence posts, hewn ties, round mine timbers, box bolts, excelsior bolts, chemical wood, shingle bolts, and other miscellaneous items.

[3] Data for 1980, 1990, and 2000 measure the demand on the domestic timber resource with the given projections of total timber demand, imports and exports.

[4] Less than 50 million board feet.

[5] Preliminary estimates.

[6] Relative prices rising from 1970 trend levels as follows: lumber—1.5 percent per year; plywood, miscellaneous products, and fuelwood—1.0 percent per year; paper and board—0.5 percent per year.

[7] Relative prices of lumber and plywood—30 percent, miscellaneous products and fuelwood—15 percent, and paper and board—10 percent, above the 1970 averages.

Note: The 1952, 1962, and 1970 data showing domestic production of all products are estimates of actual production and not directly comparable with the trend level estimates of supply shown in Chapter II. Columns may not add to totals because of rounding.

Sources: 1950–72—Based on data published by the U.S. Departments of Commerce and Agriculture.

Projections: U.S. Department of Agriculture, Forest Service.

TABLE 36.—*Consumption of industrial raw materials in the United States, by broad product groups, 1920–69*

[Millions of 1967 dollars]

Year	All industrial raw materials		Agriculture and fishery nonfoods and wildlife products [1]		Industrial timber products [2]		Minerals except fuels [3]	
	Dollars	Percent of all raw materials	Dollars	Percent of all industrial materials	Dollars	Percent of all industrial materials	Dollars	Percent of all industrial materials
1900	4,463	25.7	1,317	29.5	2,030	45.5	1,116	25.0
1901	4,482	25.5	1,198	26.7	2,107	47.0	1,177	26.3
1902	4,995	26.7	1,407	28.2	2,210	44.2	1,378	27.6
1903	4,896	25.3	1,311	26.8	2,274	46.4	1,311	26.8
1904	5,239	25.7	1,677	32.0	2,353	44.9	1,209	23.1
1905	5,520	26.6	1,629	29.5	2,415	43.8	1,476	26.7
1906	6,113	28.0	1,892	31.0	2,573	42.0	1,648	27.0
1907	5,891	27.2	1,634	27.7	2,652	44.9	1,605	27.4
1908	5,555	25.8	1,737	31.3	2,462	44.3	1,356	24.4
1909	6,139	27.4	1,798	29.3	2,604	42.4	1,737	28.3
1910	6,256	27.1	1,850	29.6	2,601	41.5	1,805	28.9
1911	6,278	26.8	2,090	33.3	2,503	39.9	1,685	26.8
1912	6,185	25.7	1,769	28.6	2,608	42.2	1,808	29.2
1913	6,454	26.9	2,033	31.5	2,548	39.5	1,873	29.0
1914	6,777	27.5	2,767	40.8	2,438	36.0	1,572	23.2
1915	5,985	25.4	1,834	30.7	2,312	38.6	1,839	30.7
1916	6,906	28.3	2,112	30.6	2,485	36.0	2,309	33.4
1917	7,023	27.1	2,564	36.5	2,306	32.8	2,153	30.7
1918	7,052	27.1	2,779	39.4	2,110	29.9	2,163	30.7
1919	6,412	25.3	2,267	35.4	2,207	34.4	1,938	30.2
1920	7,015	26.3	2,628	37.5	2,274	32.4	2,113	30.1
1921	4,634	20.3	1,400	30.2	1,914	41.3	1,320	28.5
1922	6,273	23.8	2,042	32.6	2,253	35.9	1,978	31.5
1923	7,432	25.5	2,394	32.3	2,538	34.1	2,500	33.6
1924	7,231	25.1	2,495	34.5	2,412	33.4	2,324	32.1
1925	7,913	26.7	2,811	35.6	2,487	31.4	2,815	33.0
1926	8,036	26.3	2,843	35.4	2,459	30.6	2,734	34.0
1927	8,017	26.5	3,034	37.9	2,342	29.2	2,641	32.9
1928	7,958	26.1	2,952	37.1	2,279	28.6	2,727	34.3
1929	8,637	27.0	3,197	37.0	2,411	27.9	3,029	35.1
1930	6,989	23.4	2,744	39.2	1,928	27.6	2,317	33.2
1931	5,870	20.6	2,675	45.6	1,408	24.0	1,787	30.4
1932	4,389	16.7	2,358	53.7	1,060	24.2	971	22.1
1933	5,322	19.2	2,783	52.3	1,262	23.7	1,277	24.0
1934	5,421	18.9	2,781	51.3	1,342	24.8	1,298	23.9
1935	6,103	21.2	2,909	47.7	1,576	25.8	1,618	26.5
1936	7,590	24.0	3,372	44.4	1,876	24.7	2,342	30.9
1937	7,981	24.8	3,359	42.1	2,012	25.2	2,610	32.7
1938	6,359	21.1	2,838	44.6	1,756	27.6	1,765	27.8
1939	7,820	23.7	3,353	42.9	1,982	25.3	2,485	31.8
1940	8,655	24.8	3,580	41.4	2,140	24.7	2,935	33.9
1941	11,194	29.0	4,356	38.9	2,498	22.3	4,340	38.8
1942	11,136	28.3	4,197	37.7	2,528	22.7	4,411	39.6
1943	10,801	26.7	4,207	38.9	2,322	21.5	4,272	39.6
1944	10,489	24.8	4,143	39.5	2,289	21.8	4,057	38.7
1945	10,136	24.2	4,063	40.1	2,086	20.6	3,987	39.3
1946	10,650	25.4	4,389	41.2	2,428	22.8	3,833	36.0
1947	10,786	25.1	4,078	37.8	2,536	23.5	4,172	38.7
1948	11,346	26.3	4,150	36.6	2,705	23.8	4,491	39.6
1949	10,376	24.8	3,635	35.0	2,378	22.9	4,363	42.1
1950	12,476	27.4	4,367	35.0	2,811	22.5	5,298	42.5
1951	12,394	26.7	4,184	33.8	2,820	22.8	5,390	43.4
1952	12,277	26.3	3,952	32.2	2,807	22.9	5,518	44.9
1953	12,745	26.5	3,948	31.0	2,822	22.1	5,975	46.9
1954	12,129	25.5	3,673	30.3	2,804	23.1	5,652	46.6
1955	13,249	26.2	3,925	29.6	2,952	22.3	6,372	48.1
1956	13,640	26.1	4,017	29.4	3,064	22.5	6,559	48.1
1957	13,089	25.4	3,750	28.7	2,727	20.8	6,612	50.5
1958	12,793	25.0	3,644	28.5	2,724	21.3	6,425	50.2
1959	14,031	26.1	3,983	28.4	3,004	21.4	7,044	50.2
1960	13,476	25.1	3,814	28.3	2,831	21.0	6,831	50.7
1961	13,560	24.9	3,842	28.3	2,805	20.7	6,913	51.0
1962	14,600	25.8	4,132	28.3	2,949	20.2	7,519	51.5
1963	14,652	25.3	3,952	27.0	3,082	21.0	7,618	52.0
1964	15,539	26.0	4,068	26.2	3,254	20.9	8,217	52.9
1965	16,404	26.7	4,221	25.7	3,362	20.5	8,821	53.8
1966	17,096	26.9	4,357	25.5	3,386	19.8	9,353	54.7
1967	16,450	25.5	4,093	24.9	3,217	19.5	9,140	55.6
1968	17,158	25.6	4,193	24.4	3,400	19.8	9,565	55.8
1969	17,145	25.0	4,031	23.5	3,401	19.8	9,713	56.7

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[1] Cotton and other fibers, oils, hides, rubber, furs, and other similar products.

[2] Saw logs; veneer logs; pulpwood; turpentine; rosin; and miscellaneous products, such as poles, piling, and posts. Excludes fuelwood.

[3] Dimension stone, crushed and broken stone, sand and gravel, fire clay, common clay and shale, gypsum, metal ores, chemical and fertilizer minerals, abrasives, and other similar construction materials. Also, includes some minerals fuels that are used for nonfuel uses.

Source: U.S. Department of Commerce, Bureau of the Census and U.S. Department of the Interior, Bureau of the Mines. *Raw materials in the United States economy 1900–1969.* Working Paper 35, 1972.

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